

Test Material: Bifenthrin

MRID 49175401

Title: Schick, M. Soil adsorption/desorption of [³H]bifenthrin by the batch equilibrium method.

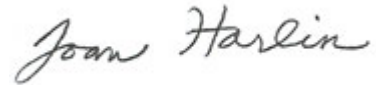
EPA PC Code: 128825

OCSPP Guideline: 835.1230

For CDM Smith

Primary Reviewer: Joan Harlin

Signature:



Date: 1/30/14

Secondary Reviewer: Kindra Bozicevich

Signature:



Date: 1/30/14

QC/QA Manager: Joan Gaidos

Signature:



Date: 1/30/14

Adsorption and desorption of Bifenthrin in six soils.

Report: MRID 49175401. Schick, M. 2013. Soil adsorption/desorption of [³H]bifenthrin by the batch equilibrium method. Unpublished study performed by PTRL West (a division of EAG), Hercules, CA; sponsored and submitted by Consumer Specialty Products Association, Inc. (CSPA), on behalf of the Bifenthrin Task Force Steering Committee/Joint Venture, Washington, DC. PTRL West Report No. 2344W. Experimental initiation November 15, 2012 and completion May 31, 2013 (p. 13). Final report July 12, 2013.

Document No.: MRID 49175401

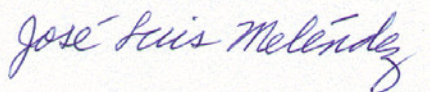
Guideline: OCSPP 835.1230

Statements: The study was conducted in accordance with USEPA Good Laboratory Practice Standards (40 CFR Part 160; p. 3). Signed and dated Data Confidentiality, GLP, and Quality Assurance statements and a Report Approval page were provided (pp. 2-5). A Certification of Authenticity statement was not provided.

Classification: This study is considered supplemental. The four highest test substance concentrations (0.100, 0.075, 0.050, and 0.025 µg/L), were higher than limit of solubility of bifenthrin (0.014 µg/L). Only one test substance concentration (0.010 µg/L) was below the solubility. It was noted that the test substance concentration in water at equilibrium were below the solubility limit. The test substance degraded during the study, and no attempts were made to identify the unidentified radioactivity. Limits of Detection (LOD) and Quantification (LOQ) for HPLC analyses and LOQs for LSC analyses were not reported.

PC Code: 128825

Signature:



Final Reviewer: José L. Meléndez

Date: February 26, 2015

Executive Summary

In a batch equilibrium study, four soils and two sediments (pH range 4.4 to 7.4) from the U.S. were used to measure sorption coefficients of [³H]bifenthrin in the dark at 20°C. Determined Freundlich Adsorption Coefficient (K_F) values ranged from 898.85 to 9,586.84 L/kg (mean K_F = 4,726.56 L/kg); respective K_{FOC} values ranged from 26,437 to 836,170 L/kg (mean K_{FOC} = 329646 L/kg).¹ The Freundlich Desorption Coefficients

¹ Sorption is a generic term that applies to absorption, adsorption, and desorption processes. Adsorption refers to sorption onto a two-dimensional surface; absorption refers to sorption into a three dimensional matrix. Both types of sorption occur in soils and sediments. Desorption refers to a sorbate becoming desorbed from a sorbent. Desorption distribution coefficients are measured by removing solution from a sorption experiment and adding fresh solution, so that all material measured in solution will be the

(K_{Fdes}) ranged from 70.74 to 17,968.31 L/kg (mean $K_F = 4,714.75$ L/kg). Percent adsorbed and percent of the desorbed, as percent of the adsorbed, were not reported. Freundlich exponents corresponding to K_F values ranged from 0.90 to 1.12 across all test soils and sediments, except for the freshwater sediment desorption K_F value (0.70).

Adsorption coefficients (K_d) ranged from 2383.65 to 3966.21 L/kg and organic carbon normalized adsorption coefficients (K_{OC}) ranged from 58138 to 476912 L/kg. **Table 3** summarizes the adsorption coefficients measured in the study. **Table 4** summarizes the desorption coefficients measured in the study.

Mass balances ranged from 90.3-105.2% of the applied for all test soils and sediments. HPLC analysis of all test soils and sediments treated at the highest test concentration showed that [3H]bifenthrin degraded during the study. Bifenthrin represented averages of 47.0-67.7% of the available radiotritium in the adsorption solutions, 38.3-93.8% in the desorption solutions, and 79.6-91.1% in the soil extracts.

Coefficients of variation (CV) across all treated [3H]-treated soils and sediments were 0.8 and 1.0 for adsorption K_F and K_{FOC} , respectively, and 1.4 and 1.9 for desorption K_F and K_{FOC} , respectively.

Results Synopsis:

desorbed material. The guideline uses the term adsorption in place of sorption and refers to the initial measurement of sorption.

Table 1. Summary of Adsorption/Desorption Results ^A

Soil/ Sediment, % OC pH	Regressed K _d (L/kg-soil)			Range of K _d (L/kg- soil)	Regressed K _{oc} (L/kg-OC)	K _F ((L/kg-soil) ^{-1/n})			1/n for adsorption	K _{FOC} (L/kg- OC) ^{-1/n}	Ceq Range (mg/L)
	Value ± SE	r ²	p-value		Value ± SE	Value ± SE	r ²	p-value	Value ± SE	Value ± SE	
Adsorption											
Iowa Sandy clay loam, (2.6% OC, pH 6.3)	3966.2 ± 228.3	0.971	3.1E-08	3288.46- 5088.65	152547 ± 8780.4	9586.8 ± 2.2	0.975	3.2E-06	1.07 ± 0.1	368725 ± 86	0.00000039- 0.00000429
Wyoming Clay (0.8% OC, pH 6.7)	3823.1 ± 91.1	0.995	1.23E-11	3205.61- 4221.90	471985 ± 11243.1	6773.0 ± 1.5	0.993	3.2E-08	1.05 ± 0.03	836170 ± 190	0.00000039- 0.00000399
California Sandy loam (0.5% OC, pH 5.2)	2457.8 ± 188.9	0.950	3.8E-07	1892.81- 3257.40	446881 ± 34338.0	2922.2 ± 3.0	0.946	9.4E-05	1.01 ± 0.1	531300 ± 553	0.00000048- 0.00000737
North Dakota Loam (4.1% OC, pH 7.4)	2383.6 ± 34.6	0.998	1.4E-13	1941.86- 2512.28	58138 ± 843.6	7168.4 ± 1.4	0.995	6.7E-09	1.09 ± 0.03	174839 ± 35	0.00000067- 0.00000600
Marine sediment (2.5% OC, pH 7.1)	2743.6 ± 113.8	0.985	1.7E-09	2248.21- 4065.57	109742 ± 4551.9	1010.2 ± 2.0	0.975	8.5E-06	0.92 ± 0.1	40407 ±80	0.00000046- 0.00000496
Freshwater sediment (3.4% OC, pH 4.4)	3250.2 ± 285.2	0.935	1.2E-06	2140.21- 4870.97	95594 ± 8387.5	898.8 ± 2.8	0.943	1.8E-04	0.90 ± 0.1	26437 ± 83	0.00000031- 0.00000485
Desorption											
Iowa Sandy clay loam,	4002.4 ± 168.3	0.984	2.0E-09	3394.50- 6044.44	153939 ± 6473	1581.7 ± 2.0	0.979	4.2E-06	0.93 ± 0.05	60833 ± 75	0.00000025- 0.00000327

(2.6% OC, pH 6.3)											
Wyoming Clay (0.8% OC, pH 6.7)	4994.0 ± 196.7	0.986	1.1E-09	4465.41- 6360.36	616546 ± 24282	4558.8 ± 1.8	0.984	7.2E-07	0.99 ± 0.04	562815 ± 227	0.00000027- 0.00000318
California Sandy loam (0.5% OC, pH 5.2)	4012.3 ± 172.2	0.984	2.4E-09	2308.82- 4875.86	729507 ± 31309	17968.3 ± 4.0	0.938	9.9E-05	1.12 ± 0.1	3266966 ± 719	0.00000037- 0.00000345
North Dakota Loam (4.1% OC, pH 7.4)	4957.5 ± 62.9	0.999	4.3E-14	4629.63- 6294.12	120915 ± 1534	2370.7 ± 1.5	0.993	6.0E-08	0.95 ± 0.03	57823 ± 37	0.00000017- 0.00000225
Marine sediment (2.5% OC, pH 7.1)	4601.4 ± 253.3	0.973	2.1E-08	3565.45- 5875.00	184056 ± 10131	1738.2 ± 3.0	0.945	1.3E-04	0.93 ± 0.1	69530 ± 119	0.00000024- 0.00000270
Freshwater sediment (3.4% OC, pH 4.4)	2778.7 ± 560.0	0.732	7.8E-04	1679.20- 7275.64	81727 ± 16470	70.7 ± 6.8	0.754	5.8E-02	0.70 ± 0.1	2080 ± 201	0.00000025- 0.00000487

Abbreviations: SE = standard error of regression.

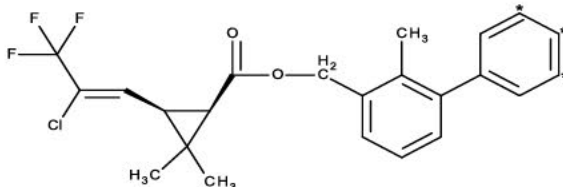
^A Data and results are in the attached Excel workbook. See **Attachment 2** for equations used for calculations.

I. Material and Methods

A. Materials

- 1. Test Material:** [³H]bifenthrin (p. 14; Figure 1, p. 49; ; Appendix B, p. 94)
Specific radioactivity: 72 Ci/mmol
Radiochemical purity: >97% (by HPLC; p. 27; Figure 2, pp. 50-51)
Chemical purity: Not reported (see Reviewer's Comment)
Lot number: 54291-13-27
Solubility in water: Not reported

[³H]Bifenthrin



2. Reference

Compounds: Bifenthrin (p. 14)
Lot number: PL09-0427
Purity: 98.1% (Appendix B, p. 95)

3. Soils/Sediment: The study was conducted with four different soils and two sediments from the U.S. The soils were collected from the 0-20 cm horizon of each field site (Appendix C, pp. 97, 99, 103, 107). Pesticide use history was provided for the Iowa sandy clay loam (Roundup Weathermax 22 oz/A, 2 applications in 2010 and RV Weathermax 22 oz/A, 2 applications in 2011) and for the California sandy loam soil (Prefar 6 qt/A in 2009 and Curbit 3EC 3 pt/A in 2007; Appendix C, pp. 97, 102). A summary of the physical and chemical properties of the soils using USDA Soil Taxonomy is provided in **Table 2**. The soils are representative of use sites.

Table 2. Description of Soil/Sediment

Soil Name	IA Sandy clay loam	WY Clay	CA Sandy loam	ND Loam	Marine Sediment	Freshwater Sediment
Origin	Jefferson, Iowa	Fremont County, Wyoming	Hughson, California	Northwood, North Dakota	Wareham, Massachusetts	Wareham, Massachusetts
USDA Textural Class	Sandy clay loam	Clay	Sandy loam	Loam	Loamy sand	Sand
% Sand	53	25	62	28	83	93
% Silt	25	28	29	45	12	4
% Clay	22	47	9	27	5	3
% OC ¹	2.6	0.81	0.55	4.1	2.5	3.4
% OM	4.4	1.4	0.95	7.0	4.3	5.8
CEC (meq/100 g soil)	17.4	28.6	5.9	23.7	34.3	7.5
pH (in 0.01M CaCl ₂)	6.3	6.7	5.2	7.4	7.1	4.4
pH (in 1:1 soil: water)	6.7	8.3	6.1	7.7	7.0	5.6
% moisture (1/3 bar)	21.0	28.8	12.7	44.5	22.8	21.5
Bulk density (disturbed, g/mL)	1.09	1.10	1.35	0.86	1.09	0.98
Soil Series	NR	NR	Hanford	NR	NR	NR
Soil Taxonomy	NR	NR	NR	NR	NR	NR
CaCO ₃ equivalence	NR	NR	NR	NR	NR	NR

Data were obtained from p. 17, Table II, pp. 35-36, and Appendix C, pp. 96-116 of the study report.

NR = not reported.

The reviewer confirmed the textural class using the following:

http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054167.

B. Study design

- 1. Experimental conditions:** A preliminary experiment was conducted to determine the stability of [³H]bifenthrin in 0.01M CaCl₂ solution (p. 18). Duplicate samples were prepared at a test concentration of 100 ng/L and *ca.* 1% acetonitrile. The samples were left undisturbed at room temperature, and triplicate 1-mL aliquots were collected at time 0 and after 3, 6, 24, 48, and 72 hours. Aliquots of the samples and acetonitrile rinse from the sample bottles were analyzed using LSC and HPLC. Mass balances were >96% for the two samples (p. 27). [³H]-Bifenthrin was shown to be stable in the two samples, comprising 84.4 and 85.5% of the applied dose (out of a total of 86.8 and 88.0% of the applied dose, respectively, in the sample + bottle rinse; p. 28).

A Tier 1 experiment was conducted to determine the optimum soil:solution ratio to be used in the definitive experiment (p. 19). Due to the low water solubility of [³H]bifenthrin, a soil:solution ratio of 1:150 (1 g soil to 150 mL of 0.01 M CaCl₂ solution) and 1:100 (1.5 g) were used for the six test systems (see Reviewer's

Comment). The nominal dose rate was 93.2 ng/L (p. 20). The samples were shaken for 24 hours at 20°C, and then centrifuged. Aliquots (3 x 1.0 mL) were analyzed using LSC. Adsorption solution recoveries averaged 4.3-7.5% of the applied for the six test systems. Recoveries for soil-less control sample adsorption solutions were 42.9-52.3% of the applied, indicating significant sorption of the test substance to the glass container walls. Recoveries in the acetonitrile bottle rinses ranged from 0.7-15.3% of the applied, indicating that sorption to the walls of the container is greatly reduced in the presence of soil.

A Tier 2 experiment was conducted to determine the appropriate equilibration times to be used in the definitive study (p. 20). Duplicate samples of each of the six test soils/sediments and duplicate soil-less controls were prepared and dosed as described for the Tier 1 samples. One experiment was conducted using the Iowa, Wyoming, and California soils, and a second experiment was conducted using the North Dakota soil and the marine and freshwater sediments. The samples were pre-equilibrated overnight, and then dosed directly via syringe and shaken overnight. The target dose rate was 100 ng/L. Duplicate samples were collected at 0, 6, 18, 24, 30, and 48 hours and centrifuged (p. 21). The supernatants were decanted into graduated cylinders containing 90 mL of acetonitrile to yield a final solution containing 40% acetonitrile by volume. Aliquots (3 x 1.0 mL) of the supernatants were analyzed using LSC. The sample bottles/soils were extracted three times with acetonitrile:0.01N HCl (9:1, v:v) and centrifuged. The extracts were combined and analyzed using LSC. The adsorption solutions and extracts were analyzed using HPLC; average mass balances were $91.0 \pm 2.6\%$ and $96.9 \pm 3.0\%$, respectively (p. 28; Appendix G, pp. 133-136). HPLC analyses showed >10% degradation of bifenthrin in the supernatants and soil extracts. Based on these results, 24-hour adsorption and desorption equilibrium times were selected for use in the definitive study, in order to minimize degradation of the test substance (p. 29; Table IV, pp. 38-39).

For the definitive study in the Tier 3 phase, triplicate aliquots (one was extra if needed) of each soil and sediment (1 g) were placed into 200-mL silanized glass centrifuge bottles, pre-equilibrated overnight in 150 mL 0.01 M CaCl₂ solution, and dosed with 150 µL of [³H]bifenthrin, dissolved in 0.1% acetonitrile, at a nominal concentration range of 10 to 100 ng/L (pp. 11, 21; Table III, p. 37). The measured test concentration range was 10.46 to 103.69 ng/L (p. 29). The samples were shaken in the dark at 20°C for 24 hours. Following centrifugation, the supernatants were decanted into graduated cylinders containing 90 mL of acetonitrile to achieve *ca.* 40% acetonitrile, and weighed (p. 22). For the desorption phase, an equivalent volume of fresh sterile 0.01 M CaCl₂ solution was added to each test vessel and the samples were equilibrated in the dark at 20°C for 24 hours. The samples were centrifuged, decanted into graduated cylinders as described for the adsorption solutions, and weighed.

Aliquots of the adsorption solutions + acetonitrile (3 x 5 mL) and the desorption + acetonitrile (3 x 5 mL) were radioassayed using LSC (p. 22). Following

desorption, at least two replicates per soil for each test concentration were extracted three times with acetonitrile:0.01M HCl (9:1, v:v; 25 mL) and centrifuged. The resultant supernatant layers were combined, the volumes were measured, and aliquots (3 x 1 mL) were analyzed using LSC. Soil samples were combusted and analyzed using LSC.

2. **Analytical procedures:** Radioactivity in the aqueous supernatants and extraction solutions was determined by Liquid Scintillation Counting (LSC; p. 22). Adsorption supernatants, desorption supernatants, and extraction solutions from the highest test concentration (100 ng/L) were analyzed using HPLC (Capcell-Pak C-18 5 µm column, gradient mobile phase of (A) 0.1% formic acid in HPLC grade water and (B) 0.1% formic acid in HPLC grade methanol, with UV (230 nm) and radioactive flow detection; p. 16). Example Limits of Detection (LOD) for LSC analysis were 0.03 ppt for the supernatants and 1.3 ppt for the combusted samples (pp. 23-24); Limits of Quantification (LOQ) were not reported. The LOD and LOQ for HPLC analysis were not reported.

The high-dose adsorption and desorption supernatants (which contained 40% acetonitrile) and soil extracts were partitioned into water and acetonitrile layers using salt, the acetonitrile layer was removed, and the water was extracted once more with acetonitrile (30 mL; p. 23). The acetonitrile layers were combined and concentrated under nitrogen. Aliquots of the concentrated adsorption and desorption solutions and the un-concentrated soil extracts were analyzed using HPLC as described previously.

II. Results and Discussion

A. Mass Balance: Recovery of radioactivity in aqueous supernatants, soil extracts, and combusted soils and sediments, determined at all test concentrations, ranged from 90.3-105.2% of the applied for the Iowa sandy clay loam soil, 98.6-103.1% for the Wyoming clay soil, 96.9-103.2% for the California sandy loam soil, 96.6-103.9% for the North Dakota loam soil, 95.8-103.6% for the marine sediment, and 94.3-104.7% for the freshwater sediment (Table V, pp. 40-44).

B. Transformation of Parent Compound: HPLC analysis of all test soils and sediments treated at the highest test concentration showed that [³H]bifenthrin degraded during the study (p. 31). Bifenthrin represented averages of 47.0, 56.8, 67.7, 62.8, 58.5, and 62.2% of the available radiotritium in the Iowa sandy clay loam, Wyoming clay, California sandy loam, North Dakota loam, marine sediment, and freshwater sediment adsorption solutions, respectively (Figure 4, pp. 53-58). Bifenthrin represented averages of 70.4, 93.8, 89.5, 38.3, 86.1, and 79.8% of the available radiotritium in the Iowa sandy clay loam, Wyoming clay, California sandy loam, North Dakota loam, marine sediment, and freshwater sediment desorption solutions, respectively (Figure 5, pp. 59-64). Bifenthrin represented averages 82.1, 90.2, 90.5, 79.6, 90.5, and 91.1% of the available radiotritium in the Iowa sandy clay loam, Wyoming clay, California sandy loam, North Dakota loam, marine sediment, and freshwater sediment soil extracts, respectively (Figure 6, pp. 65-70).

C. Findings: Reported values were calculated using linear regression (Excel) and the equations and methods discussed in the calculations section. Adsorption and desorption pH values were not reported.

Percent adsorbed and percent of the desorbed, as percent of the adsorbed, were not reported.

Equilibration concentrations in water were appropriate and ranged from 0.00000031 to 0.00000737 µg/mL following the adsorption phase, and from 0.00000017 to 0.00000487 µg/mL following desorption (Appendix I, pp. 155-169). Coefficients of variation (CV) across all soils and sediments were 0.8 and 1.0 for adsorption K_F and K_{FOC} , respectively, and 1.4 and 1.9 for desorption K_F and K_{FOC} , respectively.

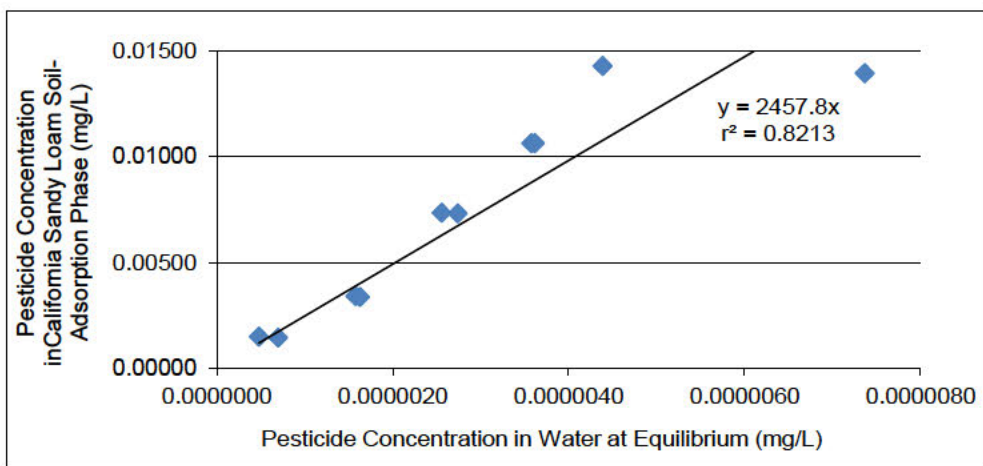
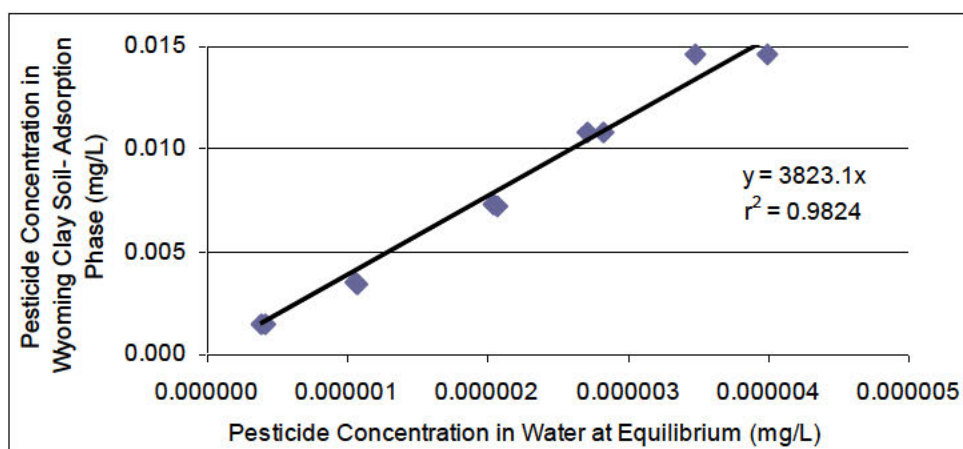
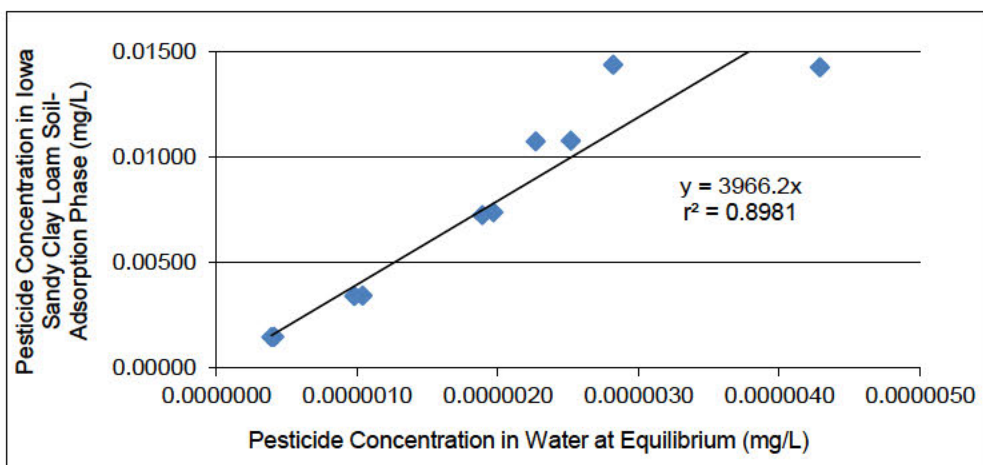
Table 3. Description of Adsorption Coefficients

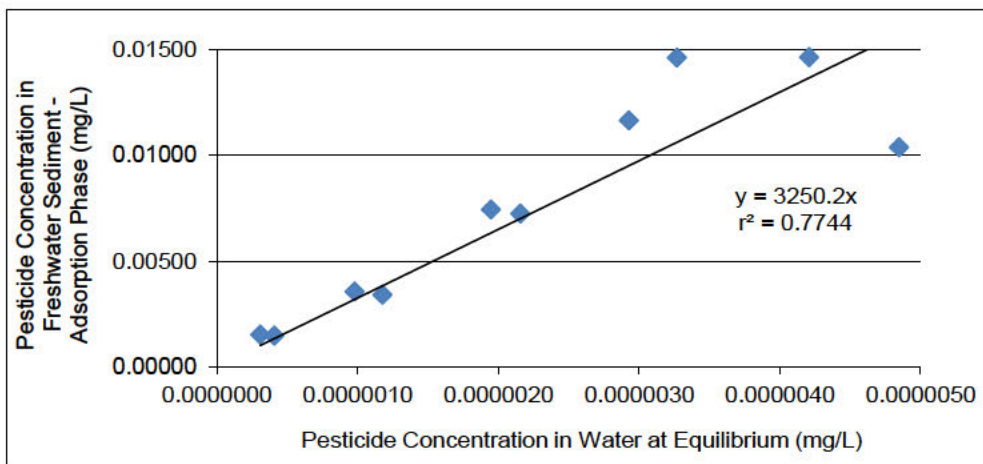
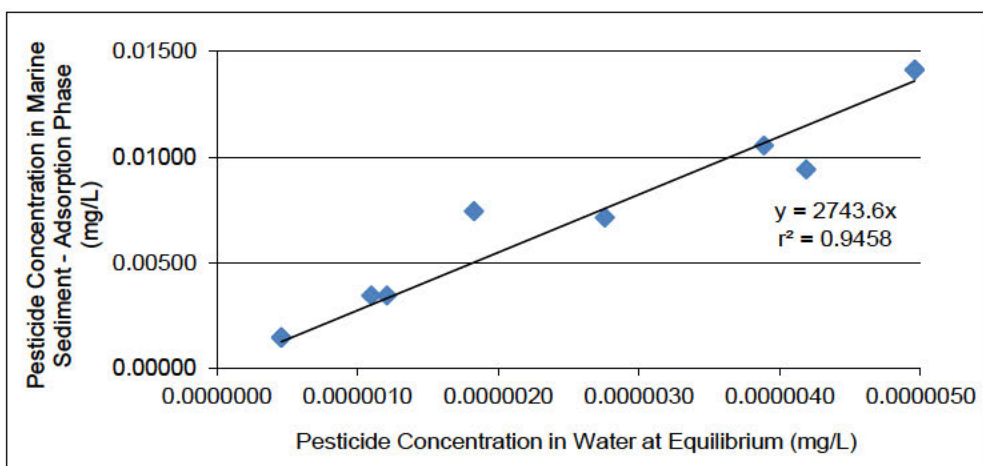
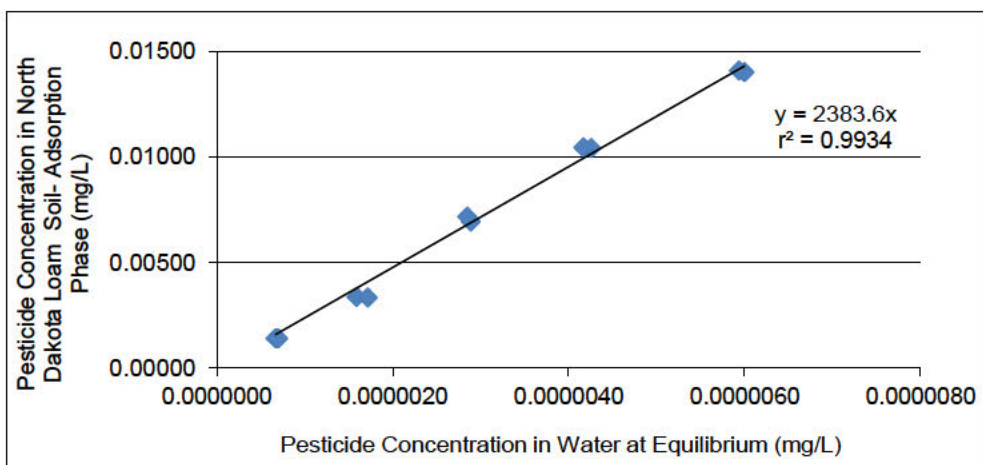
Soil	K_d (L/kg)	K_{OC}	K_F (L/kg)	K_{FOC}
Iowa Sandy clay loam	3966.21	152547	9586.84	368725
Wyoming Clay	3823.08	476912	6772.97	836170
California Sandy loam	2457.84	446881	2922.15	531300
North Dakota Loam	2383.65	58138	7168.39	174839
Marine sediment	2743.55	109742	1010.18	40407
Freshwater sediment	3250.19	95594	898.85	26437
Mean (%)	3104	222481	4727	329646
Standard Deviation (%)	685	186181	3619	315695
Coefficient of Variation (%)	22	84	77	96

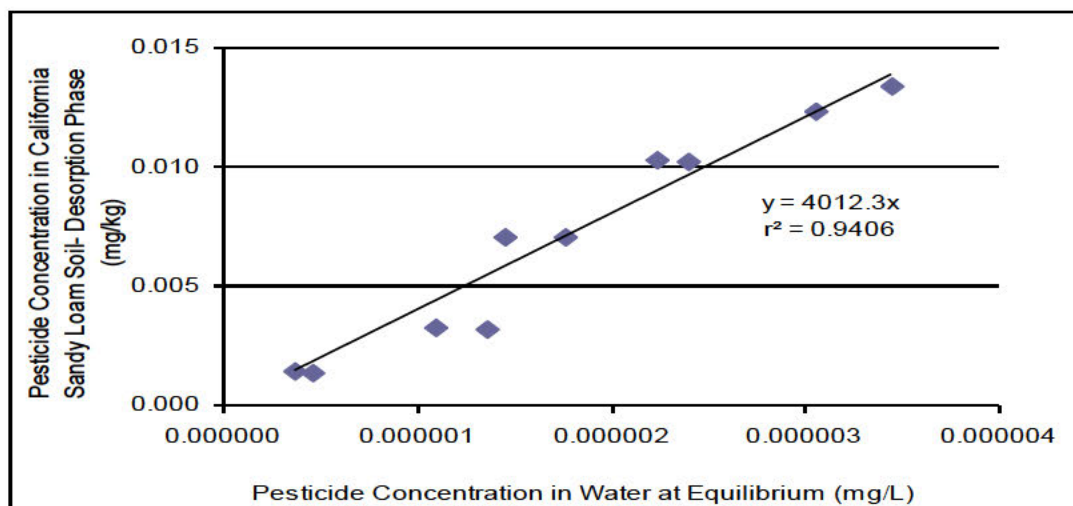
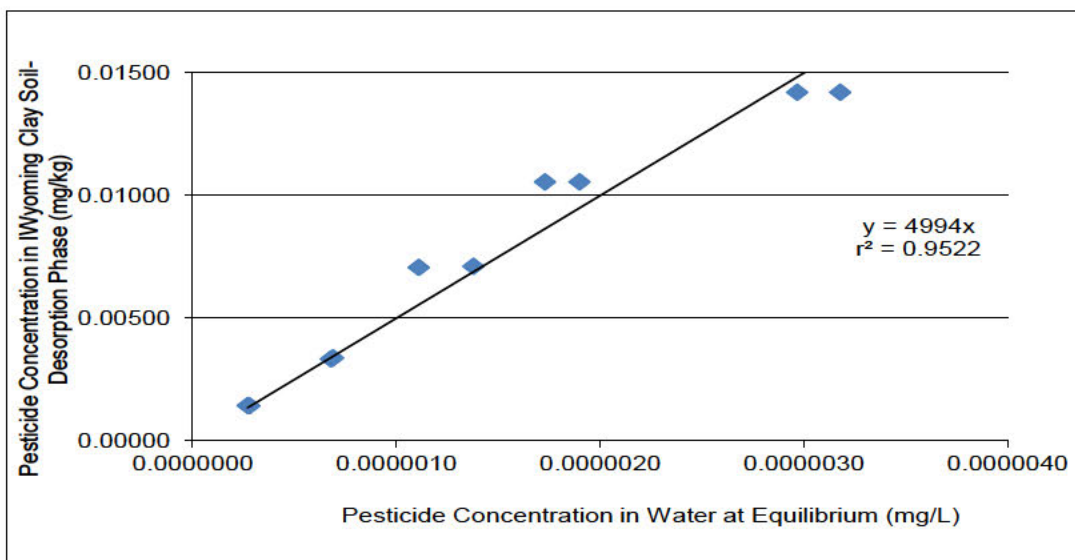
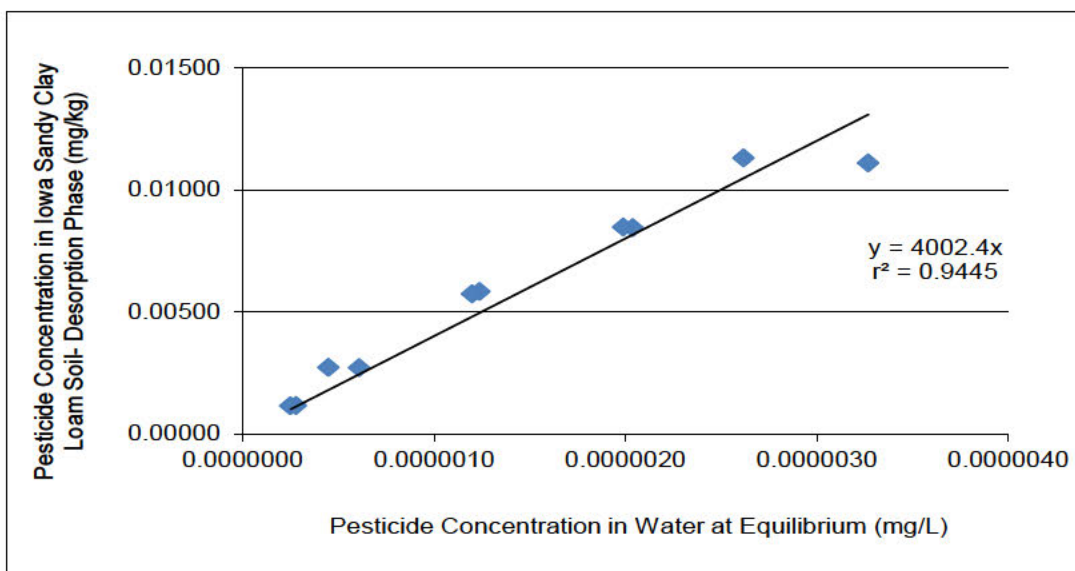
Table 4. Description of Desorption Coefficients

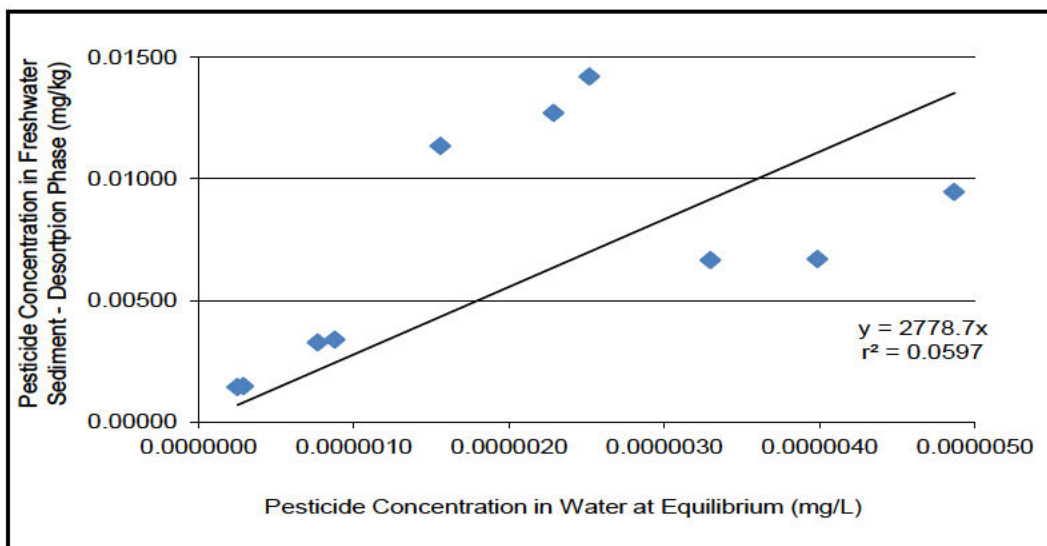
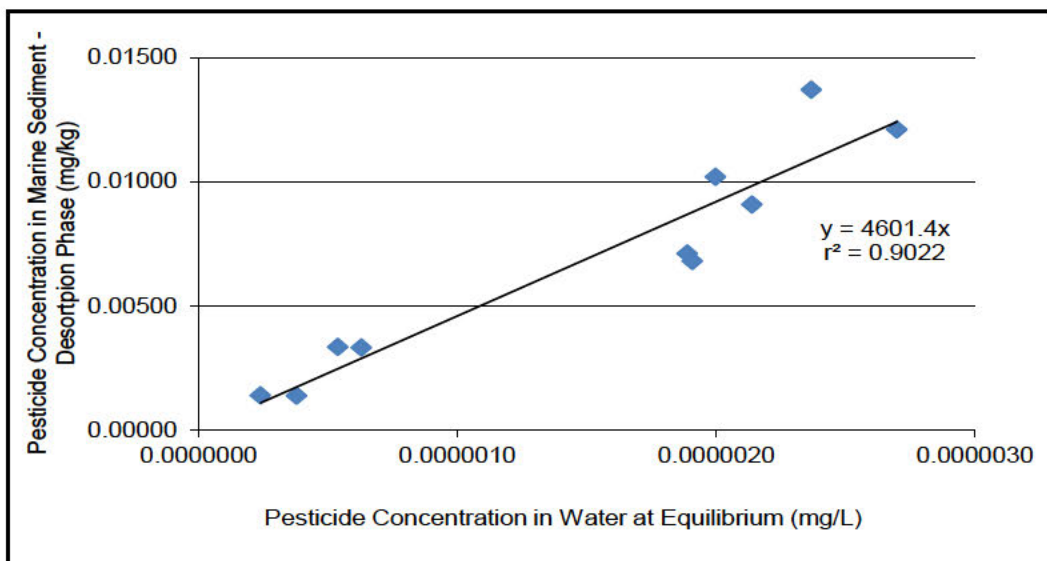
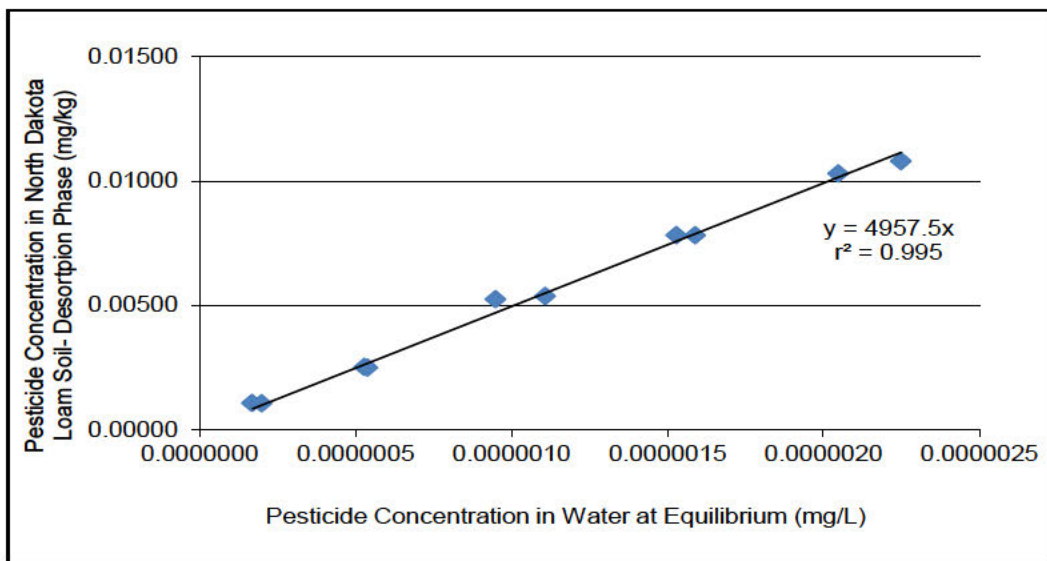
Soil	K_{des} (L/kg)	K_{OC-des}	K_{F-des} (L/kg)	$K_{FOC-des}$
Iowa Sandy clay loam	4002.41	153939	1581.67	60833
Wyoming Clay	4994.02	616546	4558.80	562815
California Sandy loam	4012.29	729507	17968.31	3266966
North Dakota Loam	4957.52	120915	2370.74	57823
Marine sediment	4601.40	184056	1738.24	69530
Freshwater sediment	2778.71	81727	70.74	2080
Mean (%)	4224	314448	4715	670008
Standard Deviation (%)	831	282105	6655	1289050
Coefficient of Variation (%)	20	90	141	192

Reviewer-reported adsorption coefficients for the four soils were lower than the study author-reported values, and for the two sediments were higher than the study author-reported values (see Reviewer's Comment; p. 30; Table VI, p. 46). Reviewer-reported desorption coefficients were higher than the study author-reported values for all soils and sediments, with the exception of the Wyoming clay soil (Table VII, p. 48).







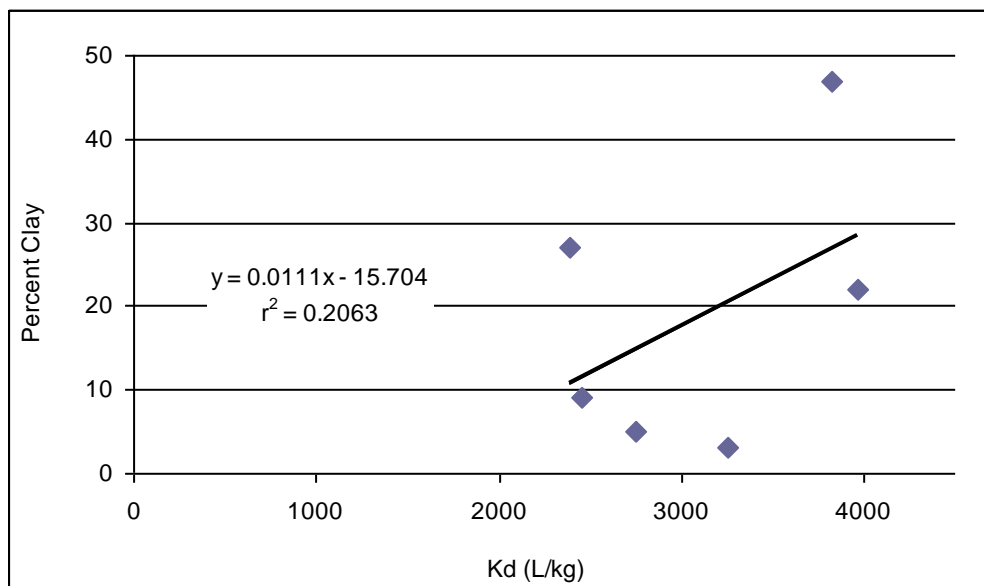
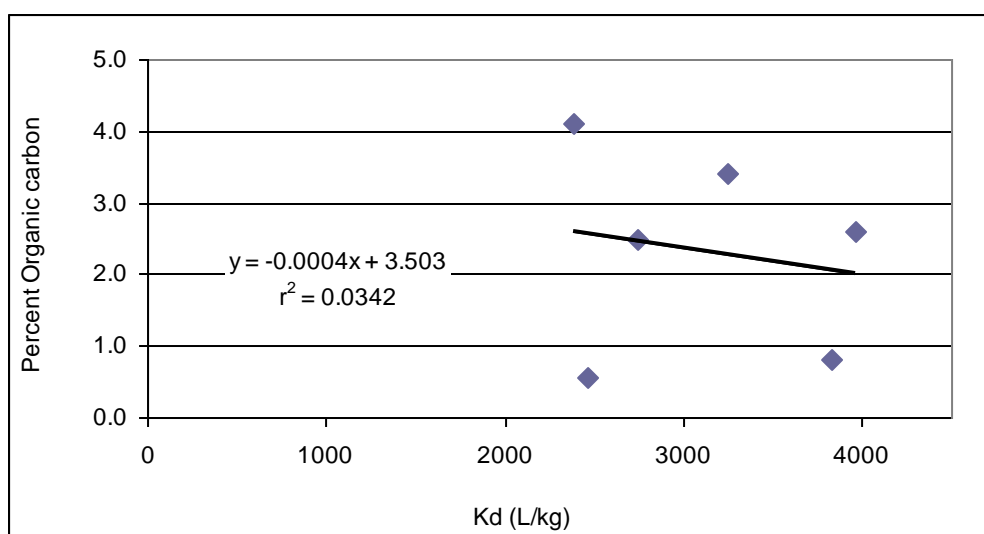


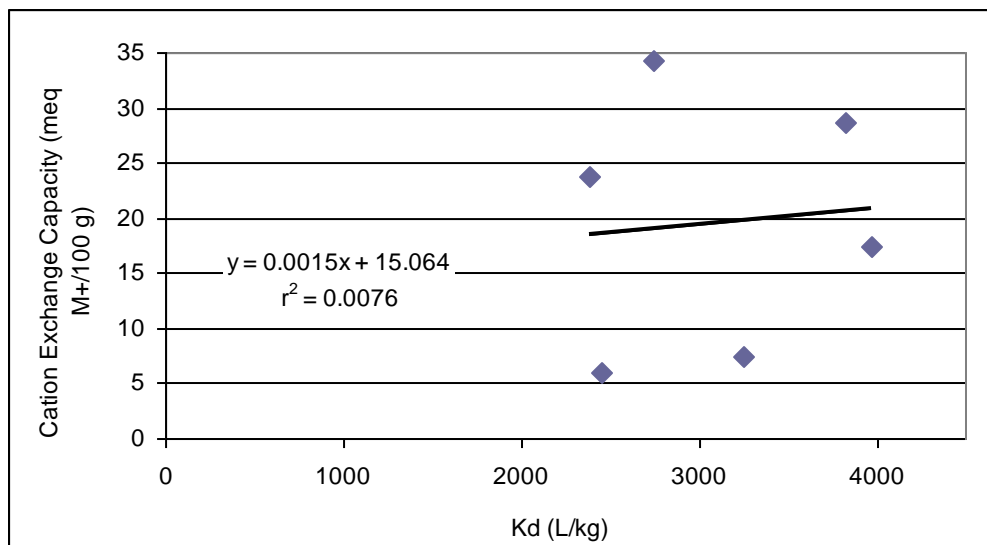
For all the additional graphs, please refer to the **Attachment 3**.

The results of the regression of K_d by percent organic carbon, percent clay, and CEC are tabulated below:

Table 5. Summary of Regressed K_d vs %OC, %Clay, and CEC

Parameter	r^2	p-value
K_d vs. % organic carbon	0.034	0.726
K_d vs. % clay	0.206	0.365
K_d vs. CEC	0.008	0.870





The data showed no correlation between the adsorption of bifenthrin to soil and percent organic carbon, percent clay content or cation ion exchange capacity.

III. Study Deficiencies and Reviewer's Comments

1. The test substance degraded during the study, and no attempts were made to identify the unidentified radioactivity. HPLC analysis of adsorption solutions, desorption solutions, and soil extracts from the high-dose soil/sediment samples showed that [^3H]bifenthrin degraded during the study (p. 31). The HPLC chromatograms presented in Figures 4-6 of the study report show multiple regions of radioactivity were detected (pp. 53-70). No attempts were made to identify these regions of radioactivity. Degradation of the test substance was also observed in the Tier 2 samples; bifenthrin degradation was >10% in the adsorption solutions, desorption solutions, and soil extracts, based on HPLC analysis (p. 28).
2. Limits of Detection (LOD) and Quantification (LOQ) for HPLC analyses and the LOQ for LSC analyses were not reported.
3. The water solubility of the test substance was not reported. It was stated that due to the low water solubility of [^3H]bifenthrin, a soil:solution ratio of 1 g of soil:150 mL of 0.01M CaCl_2 solution was selected for the definitive study (p. 28). Information available to the reviewer indicates that the solubility of bifenthrin in water is 0.014 $\mu\text{g/L}$ (Laskowski 2002).
4. There should be a minimum of 5 concentrations analysed for each soil/sediment, covering at least two orders of magnitude. Furthermore, these concentrations should be at least two orders of magnitude higher than detection limits and should not exceed half of the compound's solubility limit. Given the extremely low solubility of bifenthrin, these two review considerations were not fully met. The four highest test

substance concentrations (0.100, 0.075, 0.050, and 0.025 µg/L), were higher than limit of solubility of bifenthrin (0.014 µg/L). Only one test substance concentration (0.010 µg/L) was below the solubility.

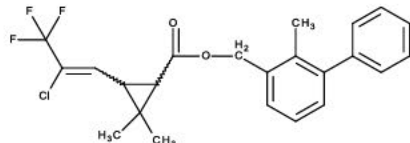
5. In the Tier 1 preliminary studies, significant adsorption was noted in the soil-less controls (p. 28). Recoveries for soil-less control sample adsorption solutions were 42.9-52.3% of the applied, indicating significant sorption of the test substance to the glass container walls. In the soil samples, recoveries for the acetonitrile bottle rinses ranged from 0.7-15.3% of the applied, indicating that sorption to the walls of the container is greatly reduced in the presence of soil. A preliminary test could have been conducted using alternate test containers to determine if there would be less adsorption to the containers. However, in the definitive study, recovery for all soils/sediments was >90%. The material balance table for the definitive study samples includes a column for bottle/soil extract (Table V, pp. 40-44). Thus, it appears that the bottles were extracted with the soils/sediments during the analysis in order to obtain more radioactive residues (see p. 21 of study report).
6. In the material balance table for the definitive study, it was stated in a footnote that the adsorption/desorption solutions were extracted with hexane (Table V, pp. 40-44). However, this extraction step was not mentioned in the analytical methodology section of the study report. Clarification by the registrant should be provided.
7. It was stated that [³H]bifenthrin degraded slightly in the final dosing solution during the study, with a final purity of 92%, based on HPLC analysis (p. 27; Figure 2, pp. 50-51). All dosing solutions were determined to be homogeneous during the application processes.
8. It was not clear that the definitive soil samples were air-dried and sieved prior to use. The protocol states that the test soils would be air dried and sieved (2 mm) prior to use in the study, but this was not stated in the definitive study (Tier 3) methods (Appendix A, p. 82).
9. Reviewer-reported sorption coefficients for the four soils were lower than the study author-reported values, and for the two sediments were higher than the study author-reported values (p. 30; Table VI, p. 46). Due to significant degradation (>90%) of bifenthrin in some of the high-dose test systems, the study authors calculated adsorption and desorption coefficients for those test systems based on the percent bifenthrin, as determined by HPLC analysis (p. 31; Appendix I, pp. 155-185). For the K_d calculations of the 100 ng/L samples, the percent bifenthrin for the individual samples was used; for all other concentrations, the averages of the two samples were used (p. 31).
10. Bifenthrin represented >90% of the available radiotritium in the soil-less control adsorption and desorption solutions, and >80% of the available radiotritium in the HPLC analysis of the soil-less control bottle rinses (p. 31; Figures 9-11, pp. 77-79).

11. The study author concluded that the adsorption K_{OC} values predict bifenthrin to exhibit extremely low mobility in the six soils/sediments (p. 32). The author added that the desorption K_{OC} values indicate that, once adsorbed to soil, it is extremely unlikely that bifenthrin will be removed.

IV. References

- Laskowski, DA. 2002. Physical and chemical properties of pyrethroids. Reviews of Environmental Contamination and Toxicology. 174: 49-170.
- U.S. Environmental Protection Agency. 2008. Fate, Transport and Transformation Test Guidelines, OPPTS 835.1230, adsorption/desorption (batch equilibrium). Office of Chemical Safety and Pollution Prevention (formerly OPPTS), Washington, DC. EPA 712-C-08-019.

Attachment 1. Bifenthrin and Its Environmental Transformation Products. ^A

Code Name/ Synonym	Chemical Name	Chemical Structure	Study Type	MRID	Maximum %AR (day)	Final %AR (study length)
PARENT						
Bifenthrin	<p>IUPAC : 2-Methylbiphenyl-3-ylmethyl (1RS,3RS)-3-[(Z)-2-chloro-3,3,3-trifluoroprop-1-enyl]-2,2-dimethylcyclopropanecarboxylate</p> <p>CAS: (2-Methyl[1,1'-biphenyl]-3-yl)methyl (1R,3R)-rel-3-[(1Z)-2-chloro-3,3,3-trifluoro-1-propen-1-yl]-2,2-dimethylcyclopropanecarboxylate</p> <p>CAS No.: 82657-04-3</p> <p>Formula: C₂₃H₂₂ClF₃O₂</p> <p>MW: 422.9 g/mol</p> <p>SMILES: <chem>c1ccccc1c2c(C)c(COC(=O)C3C(C)(C)C3C=C(Cl)C(F)(F)F)ccc2</chem></p>		835.1230 Batch equilibrium	49175401	NA	NA
MAJOR (>10%) TRANSFORMATION PRODUCTS						
No major transformation products were identified.						
MINOR (<10%) TRANSFORMATION PRODUCTS						
No minor transformation products were identified.						
REFERENCE COMPOUNDS NOT IDENTIFIED						
All compounds used as reference compounds were identified.						

^A AR means "applied radioactivity". MW means "molecular weight". NA means "not applicable".

Attachment 2: Calculations

Calculations were performed by the reviewer using Excel and the following equations.

C_{eq} range is the range of test concentrations in water at equilibrium.

C_s is the test concentrations sorbed to soil or sediment at equilibrium.

$$K_d - \text{Distribution Coefficient for Adsorption} = C_s / C_{eq} \quad (\text{eq 1})$$

- Regressed K_d is calculated using linear regression of C_s versus C_{eq} with a forced zero intercept over the range of measured C_{eq} for each soil/sediment.
- Range of K_d reflects the range of each K_d measured at a specific concentration in a soil/sediment

$$K_{OC} - \text{Organic Carbon Normalized Adsorption Coefficient} = \text{regressed } K_d * 100 / \% \text{ OC} \quad (\text{eq 2})$$

$$\text{Standard Error (SE) of } K_{OC} = K_d \text{ SE} * 100 / \% \text{ OC} \quad (\text{eq 3})$$

K_F -Freundlich Adsorption Coefficient and the Freundlich exponent ($1/n$) were calculated using nonlinear regression of $C_s = K_F \times C_{eq}^{1/n}$. C_s should be expressed in mg/kg and C_{eq} should be expressed in mg/L in the regression. (eq 4)

$$K_{FOC} - \text{Organic Carbon Normalized Adsorption Coefficient} = K_F * 100 / \% \text{ OC} \quad (\text{eq 5})$$

$$\text{Standard Error (SE) of } K_{FOC} = K_F \text{ SE} * 100 / \% \text{ OC} \quad (\text{eq 6})$$

K_{DES} -Apparent Desorption Coefficient = C_s / C_{eq} where C_s and C_{eq} are measured after an initial sorption measurement and the soil/sediment is placed in a new solution and allowed to equilibrate, so that any material in solution desorbed from the soil/sediment. (eq 7).

- Regressed K_{DES} is calculated using linear regression of C_s versus C_{eq} over the range of C_{eq} measured with a forced zero intercept for each soil/sediment.
- Range of K_{DES} reflects the range of each K_{DES} measured at a specific concentration in a soil/sediment

$$K_{OC-DES} - \text{Organic Carbon Normalized Apparent Desorption Coefficient} = \text{regressed } K_{DES} * 100 / \% \text{ OC} \quad (\text{eq 8})$$

$$\text{Standard Error of } K_{OC-DES} = K_{DES} \text{ SE} * 100 / \% \text{ OC} \quad (\text{eq 9})$$

K_{F-DES} -Freundlich Desorption Coefficient and the Freundlich Desorption exponent ($1/n$) were calculated using nonlinear regression of $C_s = K_{F-DES} \times C_{eq}^{1/n}$ (eq 10)

$$K_{\text{FOC-DES}} - \text{Organic Carbon Normalized Freundlich Desorption Coefficient} = K_{\text{F-DES}} * 100 / \% \text{OC} \quad (\text{eq 11})$$

$$\text{Standard Error of } K_{\text{FOC-DES}} = K_{\text{F}} \text{ SE} * 100 / \% \text{OC} \quad (\text{eq 12})$$

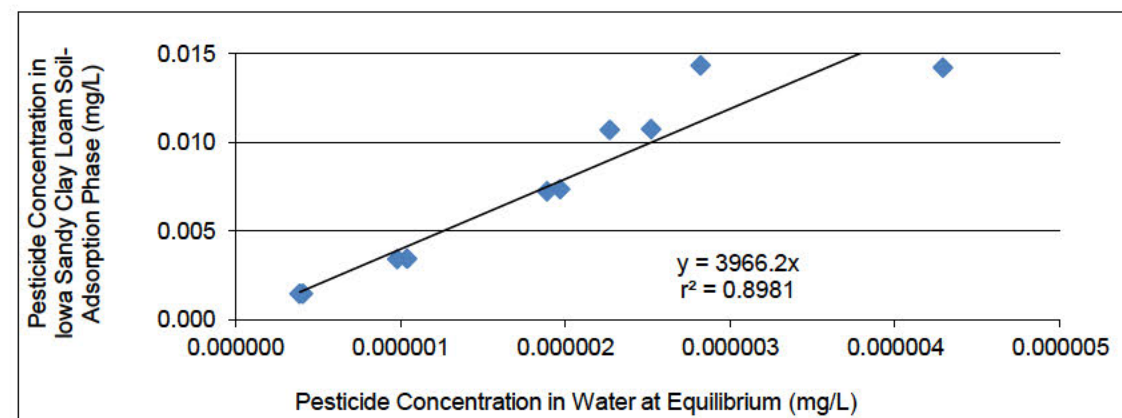
Attachment 3: Statistics Spreadsheets and Graphs

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.1230

Reviewer-calculated Adsorption K_d values

Iowa Sandy Clay Loam			
Initial soln concn (C_o) (ng/L)	Concen in soln at ads equil (C_{eq}) ($\mu\text{g/mL}$)	Concen in soil at ads equil (C_s) ($\mu\text{g/g}$)	K_d
10	0.00000041	0.00146	3560.98
10	0.00000039	0.00145	3717.95
25	0.00000104	0.00342	3288.46
25	0.00000098	0.00340	3469.39
50	0.00000197	0.00736	3736.04
50	0.00000189	0.00723	3825.40
75	0.00000227	0.01071	4718.06
75	0.00000252	0.01075	4265.87
100	0.00000282	0.01435	5088.65
100	0.00000429	0.01422	3314.69

Data were obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.985416909
R Square	0.971046485
Adjusted R Square	0.859935374
Standard Error	0.001576271
Observations	10

ANOVA

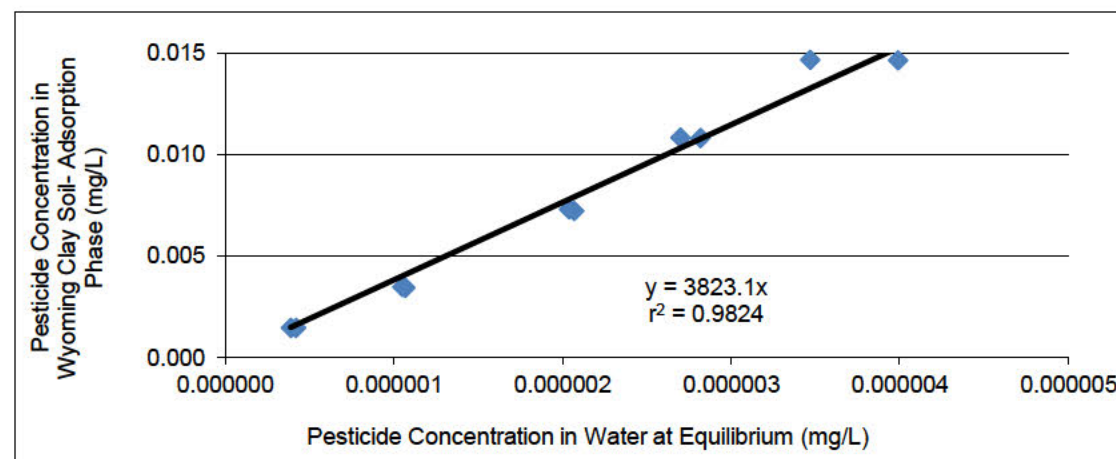
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.000749969	0.000749969	301.8430907	1.22797E-07
Residual	9	2.23617E-05	2.48463E-06		
Total	10	0.000772331			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	3966.214997	228.2893402	17.37363205	3.13072250176802E-08±	3449.788631	4482.641363	3449.788631	4482.641363

Reviewer-calculated Adsorption K_d values

Wyoming Clay			
Initial soln concn (C_o) (ng/L)	Concen in soln at ads equil (C_{eq}) ($\mu\text{g/mL}$)	Concen in soil at ads equil (C_s) ($\mu\text{g/g}$)	K_d
10	0.00000039	0.00147	3769.23
10	0.00000042	0.00146	3476.19
25	0.00000107	0.00343	3205.61
25	0.00000105	0.00348	3314.29
50	0.00000207	0.00722	3487.92
50	0.00000204	0.00730	3578.43
75	0.00000270	0.01084	4014.81
75	0.00000282	0.01081	3833.33
100	0.00000399	0.01463	3666.67
100	0.00000347	0.01465	4221.90

Data were obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.997456282
R Square	0.994919034
Adjusted R Square	0.883807923
Standard Error	0.000670616
Observations	10

Chemical: Bifenthrin
PC Code: 128825
MRID: 49175401
Guideline No: 835.123

ANOVA

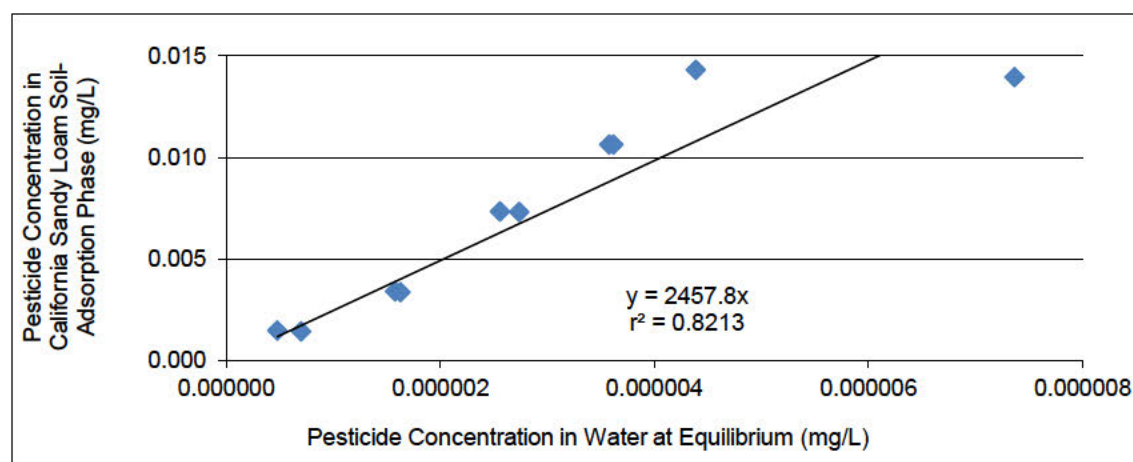
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.00079256	0.00079256	1762.316731	1.14235E-10
Residual	9	4.04753E-06	4.49726E-07		
Total	10	0.000796607			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	3823.076838	91.06909999	41.9799563	1.23152E-11	3617.064222	4029.089454	3617.064222	4029.089454

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.123

Reviewer-calculated Adsorption K_d values

California Sandy Loam			
Initial soln concn (C_o) (ng/L)	Concen in soln at ads equil (C_{eq}) (µg/mL)	Concen in soil at ads equil (C_s) (µg/g)	K_d
10	0.00000048	0.00148	3083.33
10	0.00000070	0.00143	2042.86
25	0.00000158	0.00340	2151.90
25	0.00000163	0.00336	2061.35
50	0.00000274	0.00731	2667.88
50	0.00000256	0.00734	2867.19
75	0.00000358	0.01064	2972.07
75	0.00000362	0.01064	2939.23
100	0.00000439	0.01430	3257.40
100	0.00000737	0.01395	1892.81



Data were obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.974444823
R Square	0.949542713
Adjusted R Square	0.838431601
Standard Error	0.002064055
Observations	10

ANOVA

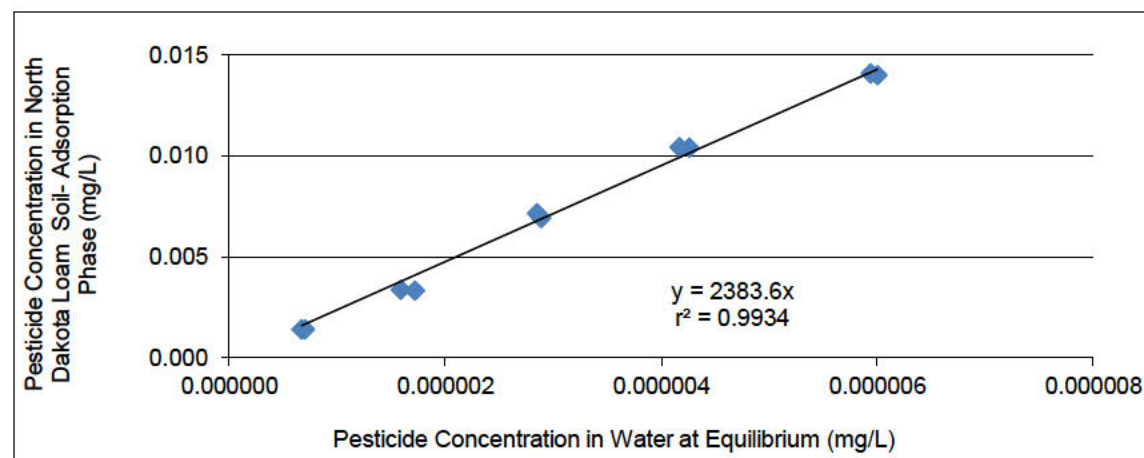
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.000721565	0.000721565	169.3686846	1.15266E-06
Residual	9	3.83429E-05	4.26032E-06		
Total	10	0.000759908			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	2457.844509	188.8590702	13.01417245	3.84682E-07	2030.61561	2885.073407	2030.61561	2885.073407

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.123

Reviewer-calculated Adsorption K_d values

North Dakota Loam			
Initial soln concn (C_o) (ng/L)	Concn in soln at ads equil (C_{eq}) ($\mu\text{g/mL}$)	Concn in soil at ads equil (C_s) ($\mu\text{g/g}$)	K_d
10	0.00000067	0.00141	2104.48
10	0.00000070	0.00141	2014.29
25	0.00000159	0.00337	2119.50
25	0.00000172	0.00334	1941.86
50	0.00000289	0.00693	2397.92
50	0.00000285	0.00716	2512.28
75	0.00000426	0.01042	2446.01
75	0.00000417	0.01044	2503.60
100	0.00000600	0.01402	2336.67
100	0.00000594	0.01409	2372.05



Data were obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.999053832
R Square	0.998108558
Adjusted R Square	0.886997447
Standard Error	0.000393942
Observations	10

Chemical: Bifenthrin
PC Code: 128825
MRID: 49175401
Guideline No: 835.123

ANOVA

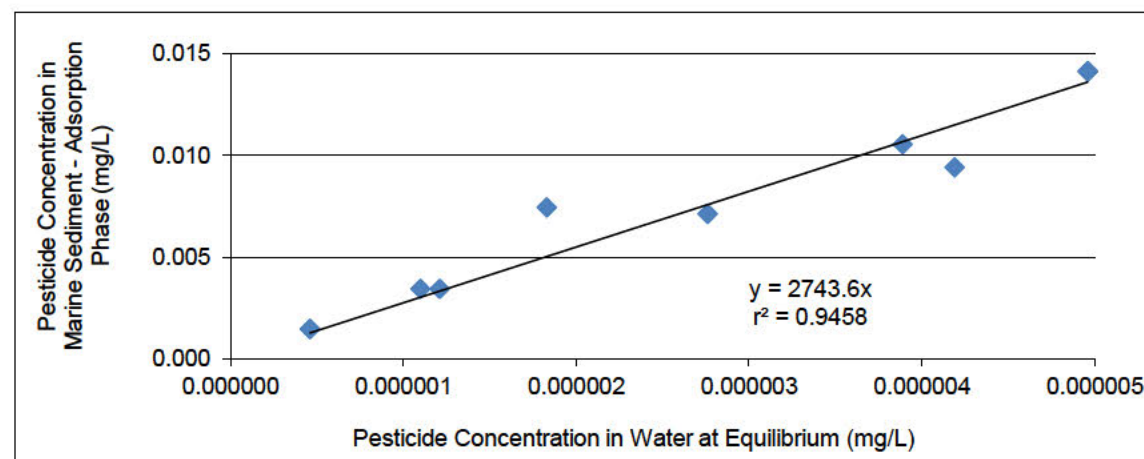
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.000737041	0.000737041	4749.275251	2.18815E-12
Residual	9	1.39671E-06	1.5519E-07		
Total	10	0.000738438			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	2383.648332	34.58824389	68.91498568	1.44107E-13	2305.404288	2461.892376	2305.404288	2461.892376

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.123

Reviewer-calculated Adsorption K_d values

Marine Sediment			
Initial soln concn (C_o) (ng/L)	Concen in soln at ads equil (C_{eq}) ($\mu\text{g/mL}$)	Concen in soil at ads equil (C_s) ($\mu\text{g/g}$)	K_d
10	0.00000046	0.00145	3152.17
10	0.00000046	0.00146	3173.91
25	0.00000121	0.00344	2842.98
25	0.00000110	0.00344	3127.27
50	0.00000183	0.00744	4065.57
50	0.00000276	0.00713	2583.33
75	0.00000389	0.01055	2712.08
75	0.00000419	0.00942	2248.21
100	0.00000496	0.01413	2848.79
100	0.00000496	0.01413	2848.79



Data were obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.992346922
R Square	0.984752414
Adjusted R Square	0.873641303
Standard Error	0.001114713
Observations	10

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.000722261	0.000722261	581.2573652	9.3405E-09
Residual	9	1.11833E-05	1.24258E-06		
Total	10	0.000733445			

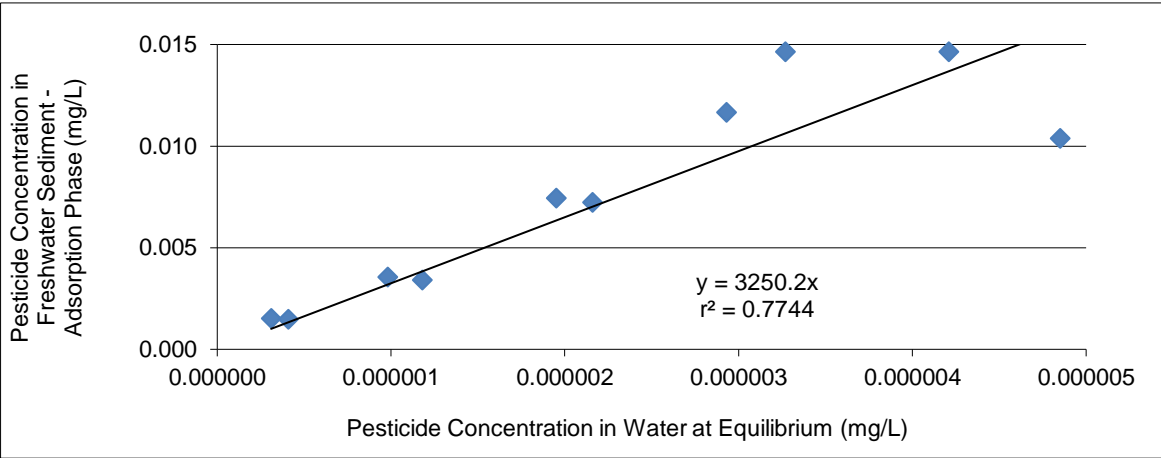
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	2743.550115	113.7964367	24.10927965	1.73745E-09	2486.124691	3000.975539	2486.124691	3000.975539

Chemical: Bifenthrin
PC Code: 128825
MRID: 49175401
Guideline No: 835.123

Reviewer-calculated Adsorption K_d values

Freshwater Sediment			
Initial soln concn (C _o) (ng/L)	Concen in soln at ads equil (C _{eq}) (µg/mL)	Concen in soil at ads equil (C _s) (µg/g)	K _d
10	0.00000031	0.00151	4870.97
10	0.00000041	0.00147	3585.37
25	0.00000098	0.00355	3622.45
25	0.00000118	0.00340	2881.36
50	0.00000216	0.00724	3351.85
50	0.00000195	0.00743	3810.26
75	0.00000293	0.01166	3979.52
75	0.00000485	0.01038	2140.21
100	0.00000327	0.01464	4477.06
100	0.00000421	0.01465	3479.81

Data were obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.967059348
R Square	0.935203783
Adjusted R Square	0.824092672
Standard Error	0.00241321
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.000756466	0.000756466	129.8969973	3.17201E-06
Residual	9	5.24122E-05	5.82358E-06		
Total	10	0.000808878			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	3250.194457	285.1739095	11.39723639	1.19289E-06	2605.086256	3895.302659	2605.086256	3895.302659

Chemical: Bifenthrin
PC Code: 128825
MRID: 49175401
Guideline No: 835.123

Reviewer-calculated Adsorption Koc values

Soil	Regressed K _d	% Organic carbon	K _{OC}	Standard Error of Koc
Iowa Sandy Clay Loam	3966.21	2.6	152547	8780.4
Wyoming Clay	3823.08	0.8	471985	11243.1
California Sandy Loam	2457.84	0.6	446881	34338.0
North Dakota Loam	2383.65	4.1	58138	843.6
Marine Sediment	2743.55	2.5	109742	4551.9
Freshwater Sediment	3250.19	3.4	95594	8387.5
Mean (%)	3104		222481	
Standard Deviation (%)	685		186181	
Coefficient of Variation (%)	22		84	

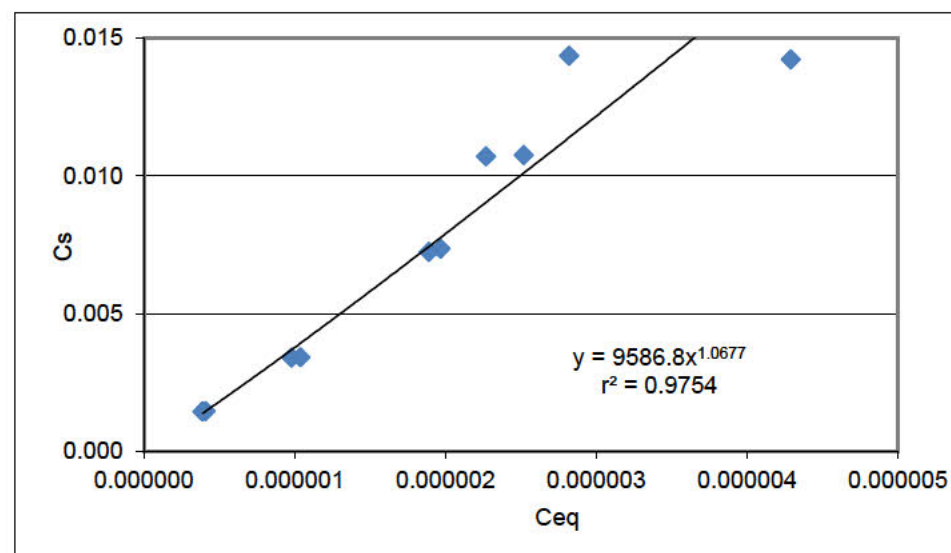
Percent organic carbon data were obtained from Table II, pp. 35-36 of the study report.

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.1230

Reviewer-calculated Adsorption KF values

Iowa Sandy Clay Loam				
Initial soln concn (C _o) (ug/mL)	Concen in soln at ads equil (C _{eq}) (μg/mL)	Log C _{eq} (ug/mL)	Concen in soil at ads equil (C _s) (μg/g)	Log C _s (μg/g)
10	0.00000041	-6.387	0.00146	-2.835647144
10	0.00000039	-6.409	0.00145	-2.838631998
25	0.00000104	-5.983	0.00342	-2.465973894
25	0.00000098	-6.009	0.00340	-2.468521083
50	0.00000197	-5.706	0.00736	-2.133122186
50	0.00000189	-5.724	0.00723	-2.140861703
75	0.00000227	-5.644	0.01071	-1.970210529
75	0.00000252	-5.599	0.01075	-1.968591536
100	0.00000282	-5.550	0.01435	-1.843148099
100	0.00000429	-5.368	0.01422	-1.847100404

Data were obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.987609931
R Square	0.975373376
Adjusted R Square	0.972295048
Standard Error	0.063132209
Observations	10

		SE
KF:	9586.839827	2.242449578
1/n:	1.067693499	0.059981676

ANOVA

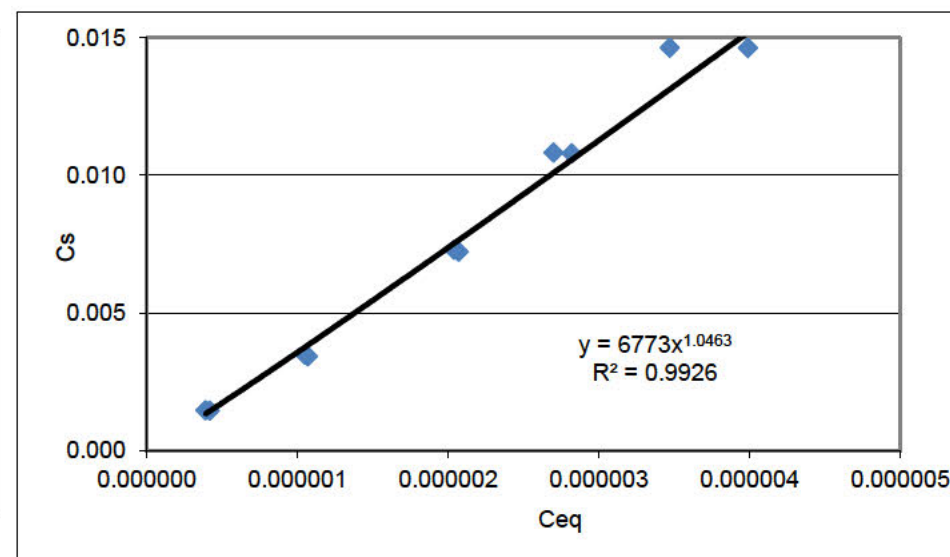
	df	SS	MS	F	Significance F
Regression	1	1.262868059	1.262868059	316.8516754	1.01578E-07
Residual	8	0.031885407	0.003985676		
Total	9	1.294753466			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.981675471	0.350722687	11.35277421	3.2674E-06	3.172907506	4.79044344	3.172907506	4.790443437
X Variable 1	1.067693499	0.059981676	17.80032796	1.01578E-07	0.929375507	1.20601149	0.929375507	1.206011492

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.1230
 Reviewer-calculated Adsorption KF values

Wyoming Clay				
Initial soln concn (C _o) (ug/mL)	Concen in soln at ads equil (C _{eq}) (ug/mL)	Log C _{eq} (ug/mL)	Concen in soil at ads equil (C _s) (ug/g)	Log C _s (ug/g)
10	0.00000039	-6.409	0.00147	-2.832682665
10	0.00000042	-6.377	0.00146	-2.835647144
25	0.00000107	-5.971	0.00343	-2.46470588
25	0.00000105	-5.979	0.00348	-2.458420756
50	0.00000207	-5.684	0.00722	-2.141462802
50	0.00000204	-5.690	0.00730	-2.13667714
75	0.00000270	-5.569	0.01084	-1.964970718
75	0.00000282	-5.550	0.01081	-1.966174306
100	0.00000399	-5.399	0.01463	-1.834755674
100	0.00000347	-5.460	0.01465	-1.834162375

Data were obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.996285856
R Square	0.992585506
Adjusted R Square	0.991658695
Standard Error	0.034760617
Observations	10

		SE
KF:	6772.9745	1.534769452
1/n:	1.046324914	0.03197263

ANOVA

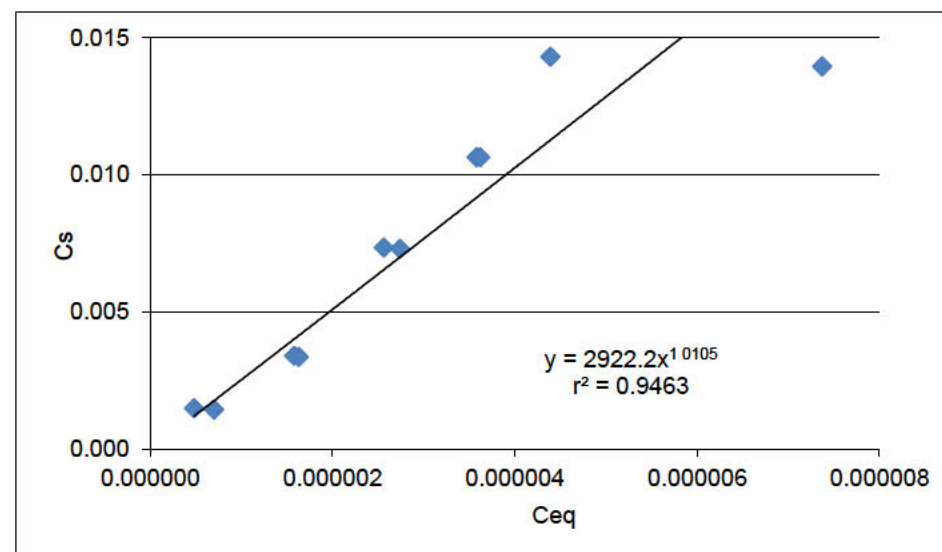
	df	SS	MS	F	Significance F
Regression	1	1.294050924	1.294050924	1070.967815	8.2885E-10
Residual	8	0.009666404	0.0012083		
Total	9	1.303717328			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.83077944	0.186043146	20.59081194	3.24041E-08	3.401763176	4.25979571	3.401763176	4.259795705
X Variable 1	1.046324914	0.03197263	32.72564461	8.2885E-10	0.972595898	1.12005393	0.972595898	1.12005393

Reviewer-calculated Adsorption KF values

California Sandy Loam				
Initial soln concn (C _o) (ug/mL)	Concen in soln at ads equil (C _{eq}) (μg/mL)	Log C _{eq} (ug/mL)	Concen in soil at ads equil (C _s) (μg/g)	Log C _s (μg/g)
10	0.00000048	-6.319	0.00148	-2.829738285
10	0.00000070	-6.155	0.00143	-2.844663963
25	0.00000158	-5.801	0.00340	-2.468521083
25	0.00000163	-5.788	0.00336	-2.473660723
50	0.00000274	-5.562	0.00731	-2.136082623
50	0.00000256	-5.592	0.00734	-2.13430394
75	0.00000358	-5.446	0.01064	-1.973058372
75	0.00000362	-5.441	0.01064	-1.973058372
100	0.00000439	-5.358	0.01430	-1.844663963
100	0.00000737	-5.133	0.01395	-1.855425792

Data were obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.972754783
R Square	0.946251868
Adjusted R Square	0.939533352
Standard Error	0.092992473
Observations	10

		SE
KF:	2922.151262	3.03944461
1/n:	1.010529367	0.08514953

Chemical: Bifenthrin
PC Code: 128825
MRID: 49175401
Guideline No: 835.1230

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1.217948603	1.217948603	140.8423827	2.33275E-06
Residual	8	0.069180801	0.0086476		
Total	9	1.287129404			

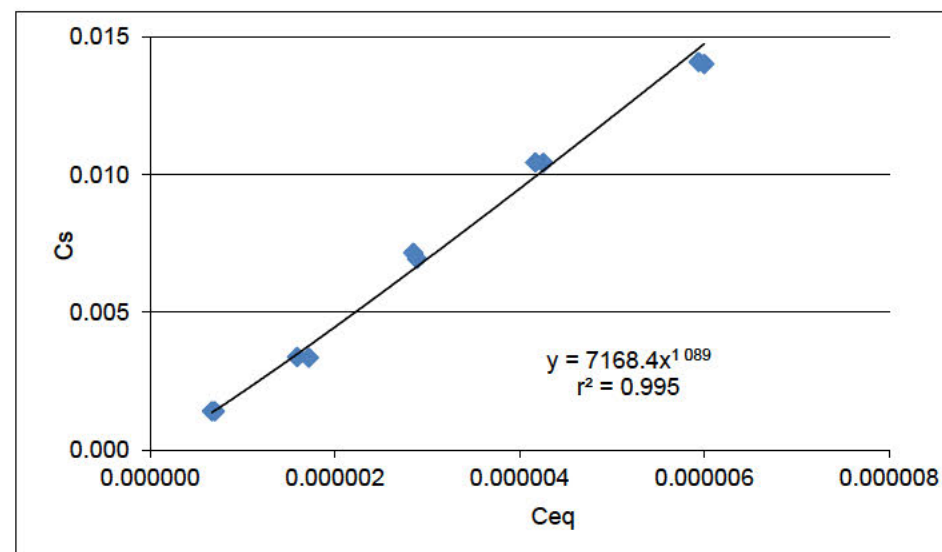
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.465702693	0.482794233	7.178426033	9.44224E-05	2.352377195	4.57902819	2.352377195	4.579028191
X Variable 1	1.010529367	0.08514953	11.86770334	2.33275E-06	0.814174197	1.20688454	0.814174197	1.206884536

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.1230

Reviewer-calculated Adsorption KF values

North Dakota Loam				
Initial soln concn (C _o) (ug/mL)	Concen in soln at ads equil (C _{eq}) (μg/mL)	Log C _{eq} (ug/mL)	Concen in soil at ads equil (C _s) (μg/g)	Log C _s (μg/g)
10	0.0000067	-6.174	0.00141	-2.850780887
10	0.0000070	-6.155	0.00141	-2.850780887
25	0.0000159	-5.799	0.00337	-2.472370099
25	0.0000172	-5.764	0.00334	-2.476253533
50	0.0000289	-5.539	0.00693	-2.159266765
50	0.0000285	-5.545	0.00716	-2.145086978
75	0.0000426	-5.371	0.01042	-1.982132281
75	0.0000417	-5.380	0.01044	-1.981299501
100	0.0000600	-5.222	0.01402	-1.853251986
100	0.0000594	-5.226	0.01409	-1.851089007

Data were obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.997500824
R Square	0.995007894
Adjusted R Square	0.994383881
Standard Error	0.028490087
Observations	10

		SE
KF:	7168.385098	1.423862626
1/n:	1.089041007	0.027272684

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1.294256272	1.294256272	1594.530091	1.70162E-10
Residual	8	0.006493481	0.000811685		
Total	9	1.300749752			

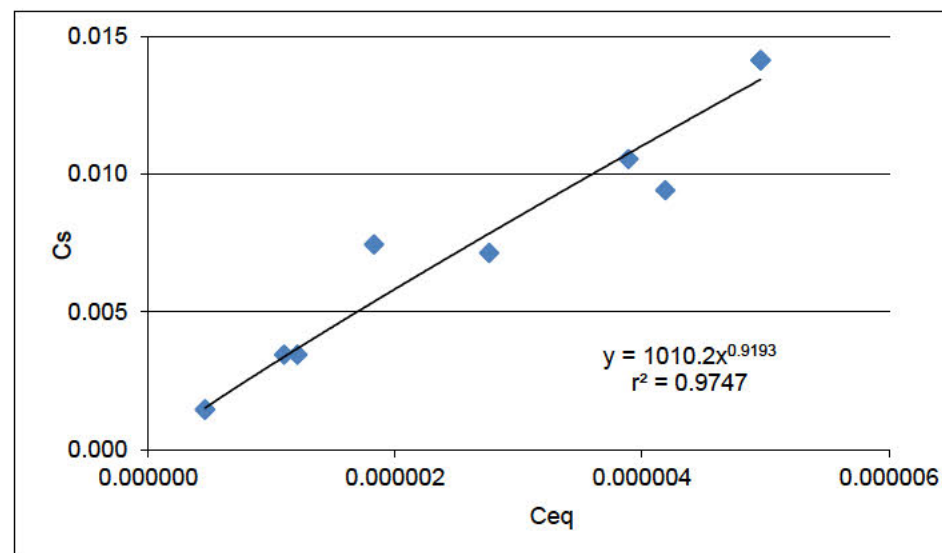
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.855421328	0.153468091	25.12197363	6.74671E-09	3.501523277	4.20931938	3.501523277	4.20931938
X Variable 1	1.089041007	0.027272684	39.9315676	1.70162E-10	1.026150086	1.15193193	1.026150086	1.151931928

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.1230

Reviewer-calculated Adsorption KF values

Marine Sediment				
Initial soln concn (C _o) (ug/mL)	Concen in soln at ads equil (C _{eq}) (ug/mL)	Log C _{eq} (ug/mL)	Concen in soil at ads equil (C _s) (ug/g)	Log C _s (ug/g)
10	0.00000046	-6.337	0.00145	-2.838631998
10	0.00000046	-6.337	0.00146	-2.835647144
25	0.00000121	-5.917	0.00344	-2.463441557
25	0.00000110	-5.959	0.00344	-2.463441557
50	0.00000183	-5.738	0.00744	-2.128427064
50	0.00000276	-5.559	0.00713	-2.14691047
75	0.00000389	-5.410	0.01055	-1.97674754
75	0.00000419	-5.378	0.00942	-2.025949097
100	0.00000496	-5.305	0.01413	-1.849857838
100	0.00000496	-5.305	0.01413	-1.849857838

Data were obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.987255464
R Square	0.974673352
Adjusted R Square	0.971507521
Standard Error	0.062918627
Observations	10

		SE
KF:	1010.180382	1.99787355
1/n:	0.919276565	0.05239146

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1.218792705	1.218792705	307.8728323	1.13662E-07
Residual	8	0.031670029	0.003958754		
Total	9	1.250462734			

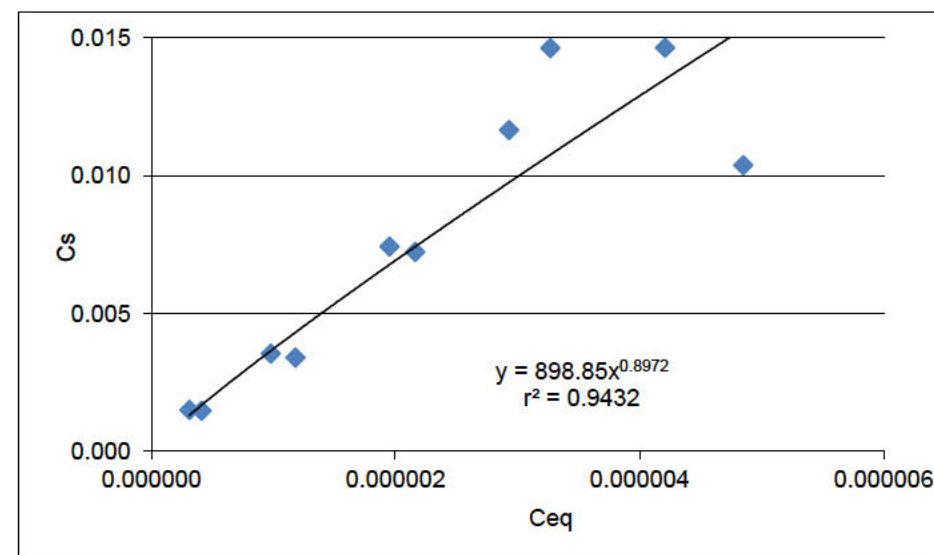
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.00439893	0.300567997	9.995737927	8.51524E-06	2.311287885	3.69750997	2.311287885	3.697509975
X Variable 1	0.919276565	0.05239146	17.54630537	1.13662E-07	0.79846164	1.04009149	0.79846164	1.040091489

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.1230

Reviewer-calculated Adsorption KF values

Freshwater Sediment				
Initial soln concn (C _o) (ug/mL)	Concen in soln at ads equil (C _{eq}) (ug/mL)	Log C _{eq} (ug/mL)	Concen in soil at ads equil (C _s) (ug/g)	Log C _s (ug/g)
10	0.00000031	-6.509	0.00151	-2.821023053
10	0.00000041	-6.387	0.00147	-2.832682665
25	0.00000098	-6.009	0.00355	-2.449771647
25	0.00000118	-5.928	0.00340	-2.468521083
50	0.00000216	-5.666	0.00724	-2.140261434
50	0.00000195	-5.710	0.00743	-2.129011186
75	0.00000293	-5.533	0.01166	-1.93330145
75	0.00000485	-5.314	0.01038	-1.983802646
100	0.00000327	-5.485	0.01464	-1.834458923
100	0.00000421	-5.376	0.01465	-1.834162375

Data were obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.97116107
R Square	0.943153825
Adjusted R Square	0.936048053
Standard Error	0.095969463
Observations	10

		SE
KF:	898.8452202	2.831786125
1/n:	0.897215121	0.077877312

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1.222467701	1.222467701	132.7306637	2.92271E-06
Residual	8	0.073681102	0.009210138		
Total	9	1.296148803			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	2.953684913	0.45206045	6.533827315	0.000181528	1.911231647	3.99613818	1.911231647	3.996138179
X Variable 1	0.897215121	0.077877312	11.52087947	2.92271E-06	0.717629718	1.07680052	0.717629718	1.076800524

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.1230

Reviewer-calculated Adsorption K_{FOC} values

Soil	Regressed K_F	% Organic carbon	K_{FOC}	Standard Error of K_{FOC}
Iowa Sandy Clay Loam	9586.84	2.6	368725	86.2
Wyoming Clay	6772.97	0.8	836170	189.5
California Sandy Loam	2922.15	0.6	531300	552.6
North Dakota Loam	7168.39	4.1	174839	34.7
Marine Sediment	1010.18	2.5	40407	79.9
Freshwater Sediment	898.85	3.4	26437	83.3
Mean (%)	4727		329646	
Standard Deviation (%)	3619		315695	
Coefficient of Variation (%)	77		96	

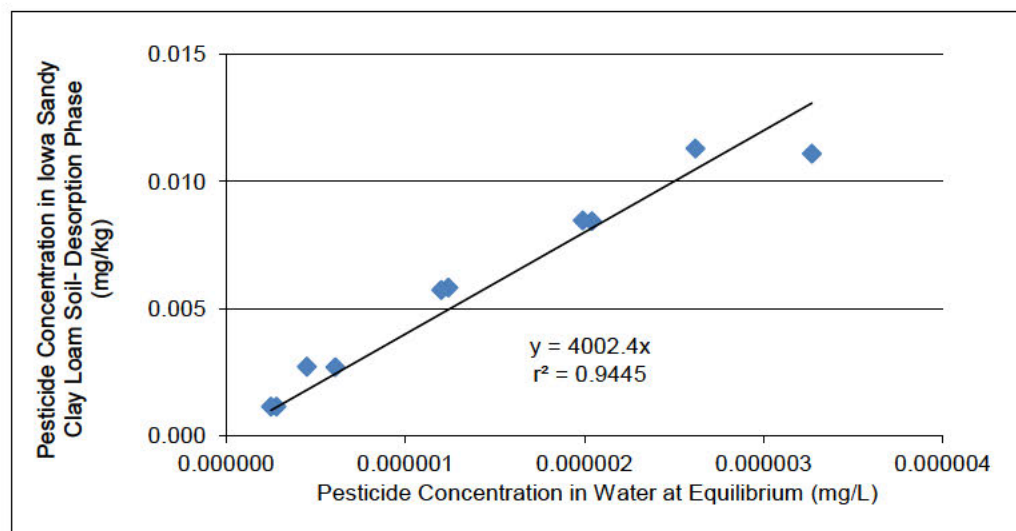
Percent organic carbon data were obtained from Table II, pp. 35-36 of the study report.

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.1230

Reviewer-calculated Desorption Kd values

Iowa Sandy Clay Loam			
Initial soln concn (C _o) (ng/L)	Concen in soln at des equil (C _{eq}) (µg/mL)	Concen in soil at des equil (C _s) (µg/g)	Kd
10	0.00000028	0.00115	4107.14
10	0.00000025	0.00114	4560.00
25	0.00000061	0.00270	4426.23
25	0.00000045	0.00272	6044.44
50	0.00000124	0.00583	4701.61
50	0.00000120	0.00573	4775.00
75	0.00000204	0.00844	4137.25
75	0.00000199	0.00847	4256.28
100	0.00000327	0.01110	3394.50
100	0.00000262	0.01130	4312.98

Data were obtained from Appendix I, pp. 156, 157, 159, 160, 162, 163, 165, 166, 166, 168, and 169 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.99213716
R Square	0.984336144
Adjusted R Square	0.873225033
Standard Error	0.000912106
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.000470519	0.000470519	565.571155	1.04065E-08
Residual	9	7.48743E-06	8.31937E-07		
Total	10	0.000478007			

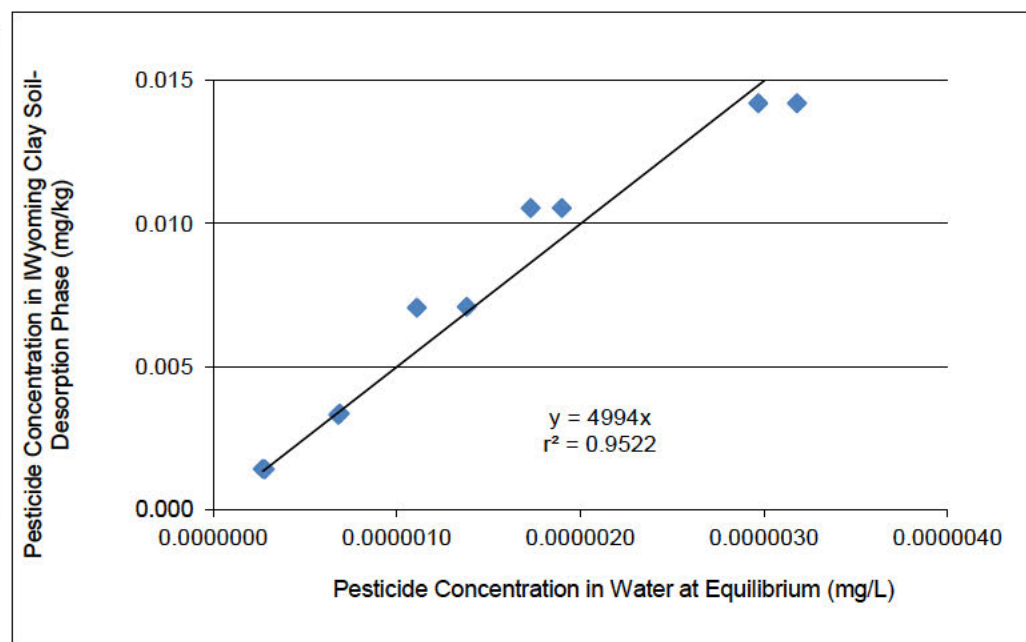
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	4002.407046	168.297486	23.78173995	1.9617E-09	3621.691683	4383.12241	3621.691683	4383.12241

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.123

Reviewer-calculated Desorption Kd values

Wyoming Clay			
Initial soln concn (C _o) (ng/L)	Concen in soln at des equil (C _{eq}) (µg/mL)	Concen in soil at des equil (C _s) (µg/g)	Kd
10	0.00000027	0.00143	5296.30
10	0.00000028	0.00142	5071.43
25	0.00000068	0.00333	4897.06
25	0.00000069	0.00337	4884.06
50	0.00000111	0.00706	6360.36
50	0.00000138	0.00710	5144.93
75	0.00000190	0.01055	5552.63
75	0.00000173	0.01055	6098.27
100	0.00000318	0.01420	4465.41
100	0.00000297	0.01420	4781.14

Data were obtained from Appendix I, pp. 156, 157, 159, 160, 162, 163, 165, 166, 166, 168, and 169 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.993092335
R Square	0.986232386
Adjusted R Square	0.875121275
Standard Error	0.001073009
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.000742284	0.000742284	644.708045	6.2013E-09
Residual	9	1.03621E-05	1.15135E-06		
Total	10	0.000752646			

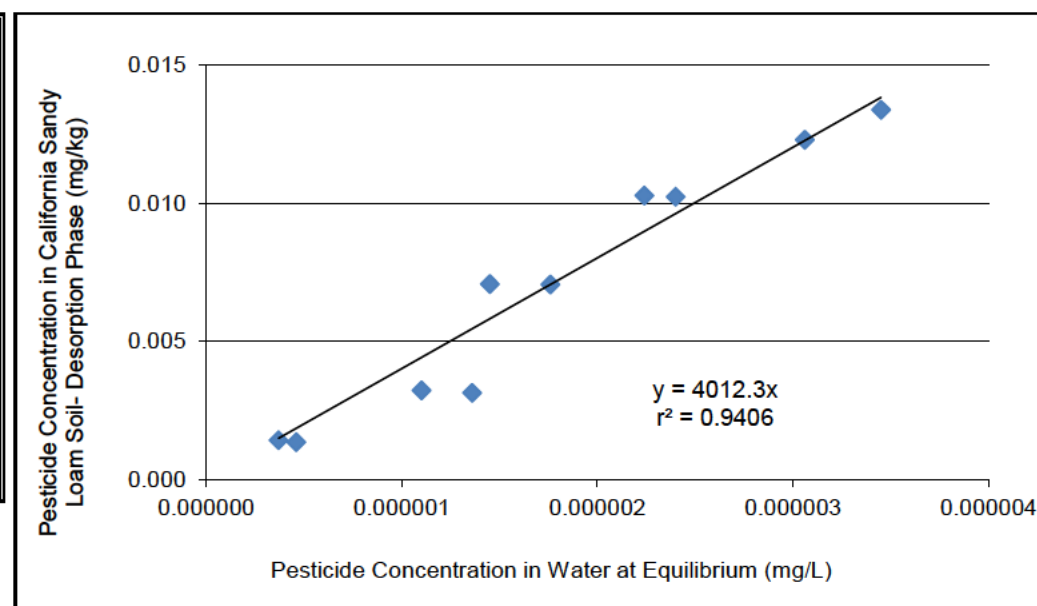
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	4994.01932	196.6838375	25.39110169	1.0967E-09	4549.089568	5438.949072	4549.089568	5438.949072

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.1230

Reviewer-calculated Desorption Kd values

California Sandy Loam			
Initial soln concn (C ₀) (ng/L)	Concen in soln at des equil (C _{eq}) (µg/mL)	Concen in soil at des equil (C _s) (µg/g)	Kd
10	0.00000037	0.00142	3837.84
10	0.00000046	0.00135	2934.78
25	0.00000110	0.00322	2927.27
25	0.00000136	0.00314	2308.82
50	0.00000145	0.00707	4875.86
50	0.00000176	0.00706	4011.36
75	0.00000224	0.01028	4589.29
75	0.00000240	0.01024	4266.67
100	0.00000306	0.01230	4019.61
100	0.00000345	0.01340	3884.06

Data were obtained from Appendix I, pp. 156, 157, 159, 160, 162, 163, 165, 166, 166, 168, and 169 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.991812896
R Square	0.983692822
Adjusted R Square	0.87258171
Standard Error	0.00109792
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.000654433	0.000654433	542.904183	1.22307E-08
Residual	9	1.08489E-05	1.20543E-06		
Total	10	0.000665281			

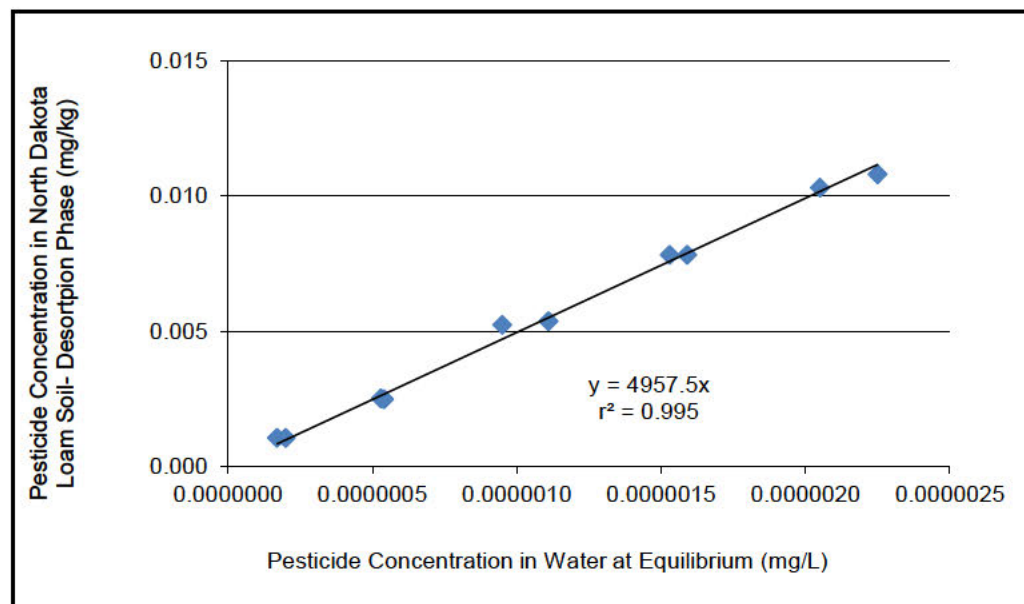
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	4012.287249	172.1989202	23.30030434	2.3518E-09	3622.746228	4401.828269	3622.746228	4401.828269

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.1230

Reviewer-calculated Desorption Kd values

North Dakota Loam			
Initial soln concn (C _o) (ng/L)	Concen in soln at des equil (C _{eq}) (µg/mL)	Concen in soil at des equil (C _s) (µg/g)	Kd
10	0.00000017	0.00107	6294.12
10	0.00000020	0.00106	5300.00
25	0.00000053	0.00252	4754.72
25	0.00000054	0.00250	4629.63
50	0.00000095	0.00524	5515.79
50	0.00000111	0.00537	4837.84
75	0.00000153	0.00782	5111.11
75	0.00000159	0.00782	4918.24
100	0.00000205	0.01030	5024.39
100	0.00000225	0.01080	4800.00

Data were obtained from Appendix I, pp. 156, 157, 159, 160, 162, 163, 165, 166, 166, 168, and 169 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.99927691
R Square	0.998554343
Adjusted R Square	0.887443232
Standard Error	0.00025856
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.000415597	0.000415597	6216.54476	7.46468E-13
Residual	9	6.0168E-07	6.68533E-08		
Total	10	0.000416198			

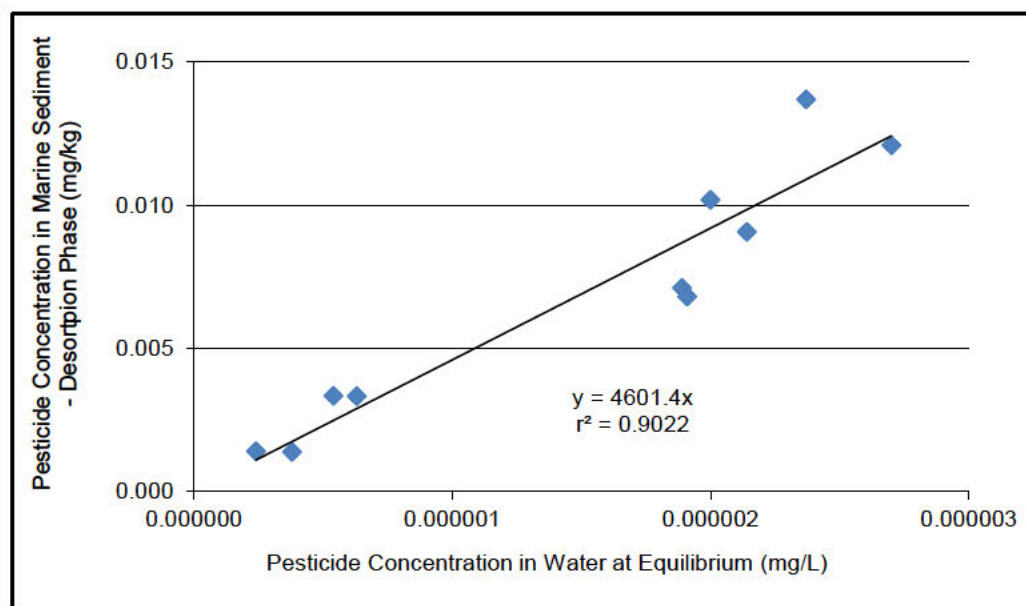
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	4957.516263	62.87668185	78.8450681	4.2986E-14	4815.279326	5099.753199	4815.279326	5099.753199

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.1230

Reviewer-calculated Desorption Kd values

Marine Sediment			
Initial soln concn (C _o) (ng/L)	Concen in soln at des equil (C _{eq}) (µg/mL)	Concen in soil at des equil (C _s) (µg/g)	Kd
10	0.00000024	0.00141	5875.00
10	0.00000038	0.00139	3657.89
25	0.00000063	0.00333	5285.71
25	0.00000054	0.00335	6203.70
50	0.00000189	0.00711	3761.90
50	0.00000191	0.00681	3565.45
75	0.00000200	0.01020	5100.00
75	0.00000214	0.00908	4242.99
100	0.00000270	0.01210	4481.48
100	0.00000237	0.01370	5780.59

Data were obtained from Appendix I, pp. 156, 157, 159, 160, 162, 163, 165, 166, 166, 168, and 169 of the study report.



SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.986639325
R Square	0.973457158
Adjusted R Square	0.862346047
Standard Error	0.001377875
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.000626659	0.000626659	330.074469	8.65608E-08
Residual	9	1.70869E-05	1.89854E-06		
Total	10	0.000643746			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	4601.404863	253.2704259	18.16795169	2.115E-08	4028.467355	5174.342371	4028.467355	5174.342371

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.123

Reviewer-calculated Desorption Kd values

Freshwater Sediment			
Initial soln concn (C _o) (ng/L)	Concen in soln at des equil (C _{eq})	Concen in soil at des equil (C _s)	Kd
10	0.00000029	0.00146	5034.48
10	0.00000025	0.00143	5720.00
25	0.00000088	0.00338	3840.91
25	0.00000077	0.00326	4233.77
50	0.00000330	0.00665	2015.15
50	0.00000399	0.00670	1679.20
75	0.00000156	0.01135	7275.64
75	0.00000487	0.00946	1942.51
100	0.00000229	0.01270	5545.85
100	0.00000252	0.01420	5634.92

Data were obtained from Appendix I, pp. 156, 157, 159, 160, 162, 163, 165, 166, 166, 168, and 169 of the study report.

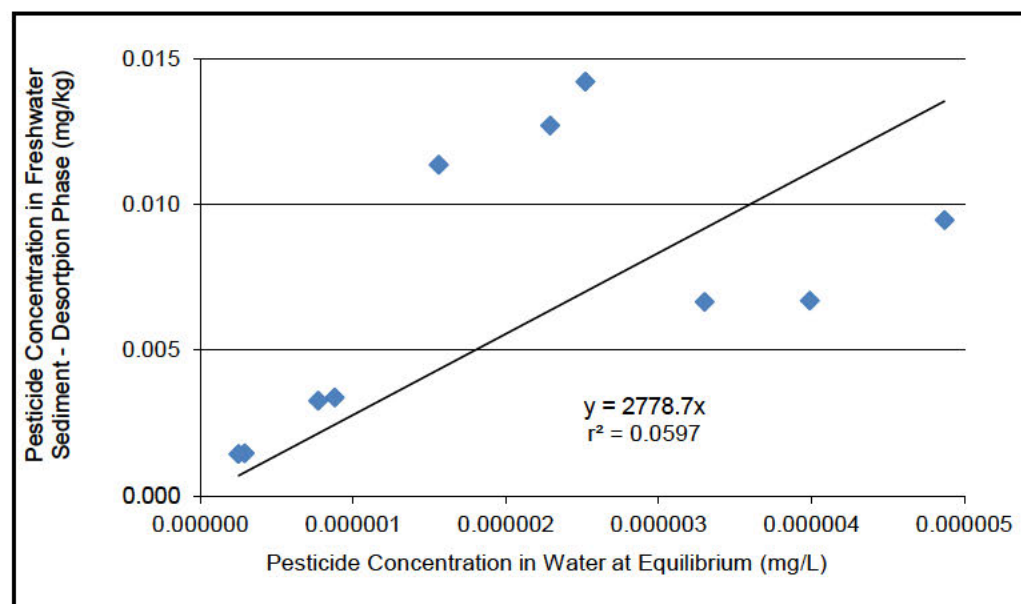
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.855766454
R Square	0.732336224
Adjusted R Square	0.621225113
Standard Error	0.004551564
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	0.000510135	0.000510135	24.6242735	0.001103728
Residual	9	0.000186451	2.07167E-05		
Total	10	0.000696585			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
X Variable 1	2778.71165	559.9661424	4.962285109	0.00077808	1511.98023	4045.44307	1511.98023	4045.44307



Chemical: Bifenthrin
PC Code: 128825
MRID: 49175401
Guideline No: 835.123

Reviewer-calculated Desorption Koc values

Soil	Regressed K _d	% Organic carbon	K _{OC}	Standard Error of Koc
Iowa Sandy Clay Loam	4002.41	2.6	153939	6473.0
Wyoming Clay	4994.02	0.8	616546	24282.0
California Sandy Loam	4012.29	0.6	729507	31308.9
North Dakota Loam	4957.52	4.1	120915	1533.6
Marine Sediment	4601.40	2.5	184056	10130.8
Freshwater Sediment	2778.71	3.4	81727	16469.6
Mean (%)	4224		314448	
Standard Deviation (%)	831		282105	
Coefficient of Variation (%)	20		90	

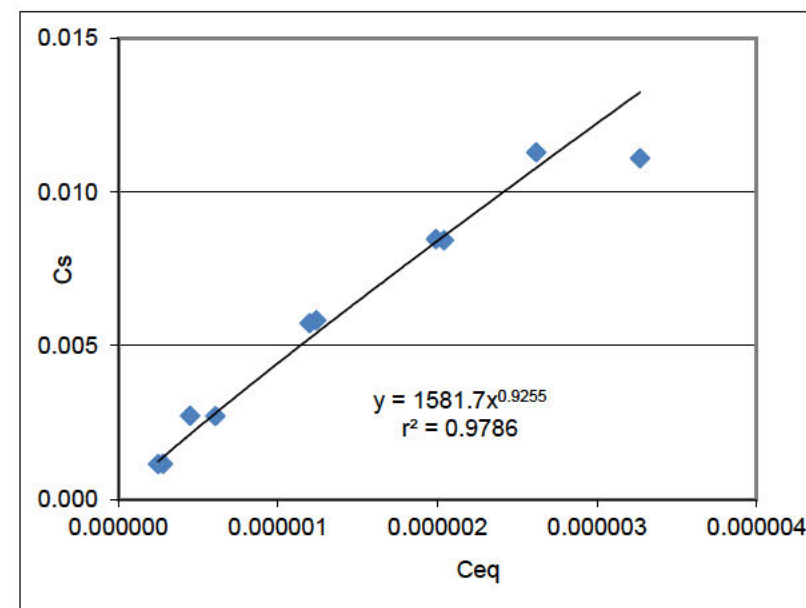
Percent organic carbon data were obtained from Table II, pp. 35-36 of the study report.

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.123

Reviewer-calculated Desorption KF values

Iowa Sandy Clay Loam				
Initial soln concn (C _o) (ug/mL)	Concen in soln at des equil (C _{eq}) (μg/mL)	Log C _{eq} (ug/mL)	Concen in soil at des equil (C _s) (μg/g)	Log C _s (μg/g)
10	0.00000028	-6.553	0.00115	-2.93930216
10	0.00000025	-6.602	0.00114	-2.943095149
25	0.00000061	-6.215	0.00270	-2.568636236
25	0.00000045	-6.347	0.00272	-2.565431096
50	0.00000124	-5.907	0.00583	-2.234331445
50	0.00000120	-5.921	0.00573	-2.241845378
75	0.00000204	-5.690	0.00844	-2.073657553
75	0.00000199	-5.701	0.00847	-2.07211659
100	0.00000327	-5.485	0.01110	-1.954677021
100	0.00000262	-5.582	0.01130	-1.946921557

Data were obtained from Appendix I, pp. 156, 157, 159, 160, 162, 163, 165, 166, 168, and 169 of the study report.



SUMMARY OUTPUT

		SE
KF:	1581.67061	1.955541454
1/n:	0.925482182	0.048443453

Regression Statistics	
Multiple R	0.989217356
R Square	0.978550978
Adjusted R Square	0.97586985
Standard Error	0.05882183
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1.26282454	1.26282454	364.9773743	5.83779E-08
Residual	8	0.027680062	0.003460008		
Total	9	1.290504601			

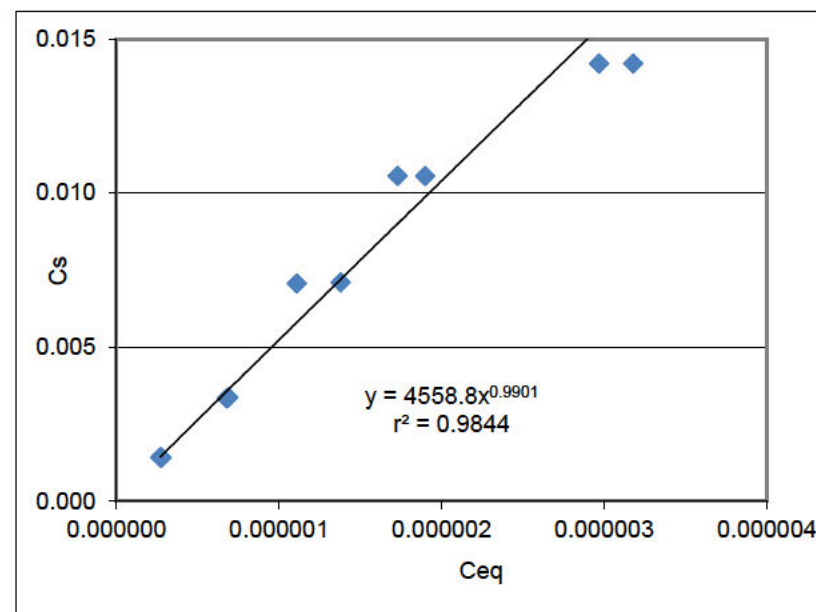
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.199116045	0.291267027	10.98344732	4.1963E-06	2.527453077	3.87077901	2.527453077	3.870779013
X Variable 1	0.925482182	0.048443453	19.10438102	5.83779E-08	0.813771379	1.03719298	0.813771379	1.037192984

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.123

Reviewer-calculated Desorption KF values

Wyoming Clay				
Initial soln concn (C _o) (ug/mL)	Concen in soln at des equil (C _{eq}) (μg/mL)	Log C _{eq} (ug/mL)	Concen in soil at des equil (C _s) (μg/g)	Log C _s (μg/g)
10	0.00000027	-6.569	0.00143	-2.844663963
10	0.00000028	-6.553	0.00142	-2.847711656
25	0.00000068	-6.167	0.00333	-2.477555766
25	0.00000069	-6.161	0.00337	-2.472370099
50	0.00000111	-5.955	0.00706	-2.151195299
50	0.00000138	-5.860	0.00710	-2.148741651
75	0.00000190	-5.721	0.01055	-1.97674754
75	0.00000173	-5.762	0.01055	-1.97674754
100	0.00000318	-5.498	0.01420	-1.847711656
100	0.00000297	-5.527	0.01420	-1.847711656

Data were obtained from Appendix I, pp. 156, 157, 159, 160, 162, 163, 165, 166, 168, and 169 of the study report.



SUMMARY OUTPUT

		SE
KF:	4558.801799	1.837645312
1/n:	0.990074589	0.044130113

Regression Statistics	
Multiple R	0.992146655
R Square	0.984354985
Adjusted R Square	0.982399359
Standard Error	0.050504787
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1.283898974	1.283898974	503.3449993	1.64853E-08
Residual	8	0.020405868	0.002550734		
Total	9	1.304304842			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.658850711	0.264261691	13.84555854	7.15798E-07	3.049462159	4.26823926	3.049462159	4.268239263

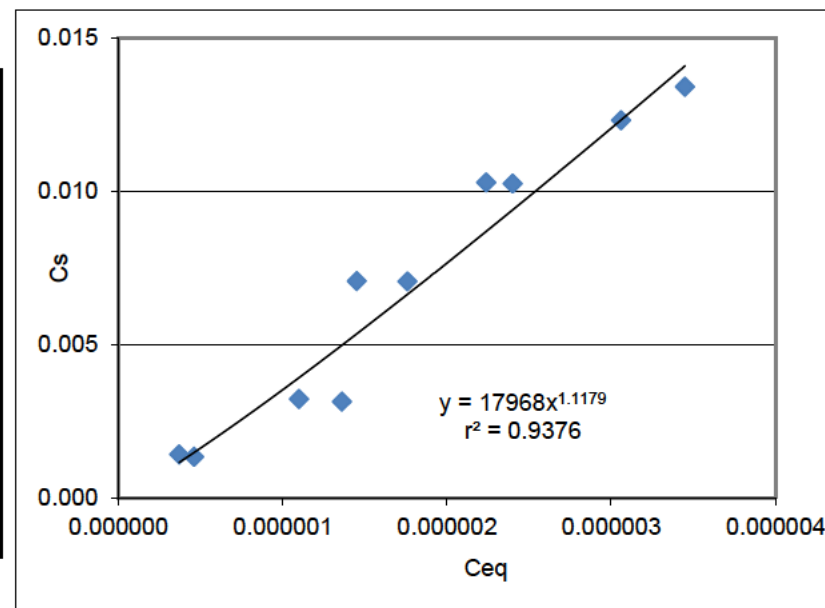
X Variable 1 0.990074589 0.044130113 22.43535155 1.64853E-08 0.888310367 1.09183881 0.888310367 1.091838811

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.123

Reviewer-calculated Desorption KF values

California Sandy Loam				
Initial soln concn (C _o) (ug/mL)	Concen in soln at des equil (C _{eq}) (ug/mL)	Log C _{eq} (ug/mL)	Concen in soil at des equil (C _s) (ug/g)	Log C _s (ug/g)
10	0.00000037	-6.432	0.00142	-2.847711656
10	0.00000046	-6.337	0.00135	-2.869666232
25	0.00000110	-5.959	0.00322	-2.492144128
25	0.00000136	-5.866	0.00314	-2.503070352
50	0.00000145	-5.839	0.00707	-2.150580586
50	0.00000176	-5.754	0.00706	-2.151195299
75	0.00000224	-5.650	0.01028	-1.988006885
75	0.00000240	-5.620	0.01024	-1.989700043
100	0.00000306	-5.514	0.01230	-1.910094889
100	0.00000345	-5.462	0.01340	-1.872895202

Data were obtained from Appendix I, pp. 156, 157, 159, 160, 162, 163, 165, 166, 168, and 169 of the study report.



SUMMARY OUTPUT

		SE
KF:	17968.31206	3.951562065
1/n:	1.117859476	0.101986108

Regression Statistics	
Multiple R	0.96828143
R Square	0.937568927
Adjusted R Square	0.929765043
Standard Error	0.099559324
Observations	10

ANOVA

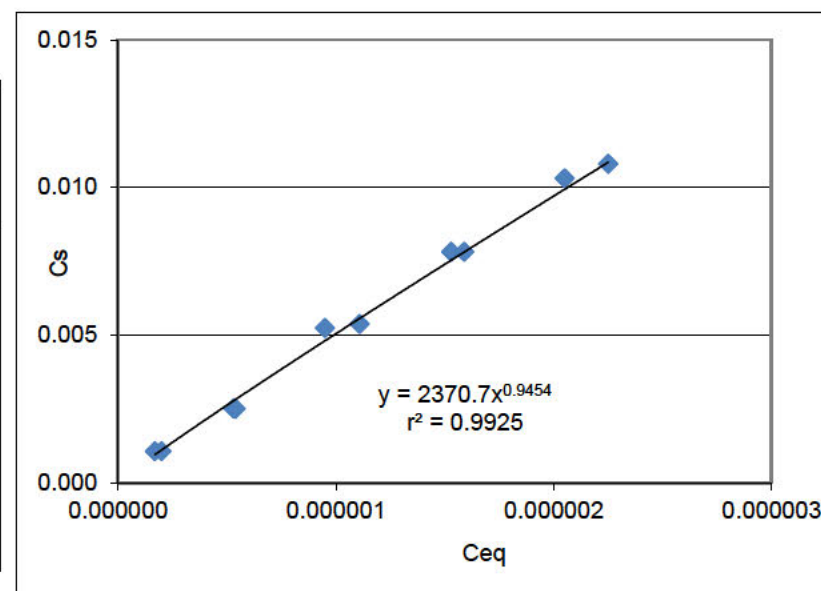
	df	SS	MS	F	Significance F
Regression	1	1.190847843	1.190847843	120.141318	4.26192E-06
Residual	8	0.079296473	0.009912059		
Total	9	1.270144315			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	4.254507281	0.596768808	7.129238706	9.90946E-05	2.878355943	5.63065862	2.878355943	5.630658619
X Variable 1	1.117859476	0.101986108	10.96089951	4.26192E-06	0.88267909	1.35303986	0.88267909	1.353039862

Chemical: Bifenthrin
PC Code: 128825
MRID: 49175401
Guideline No: 835.123

Reviewer-calculated Desorption KF values

North Dakota Loam				
Initial soln concn (C _o) (ug/mL)	Concen in soln at des equil (C _{eq}) (μg/mL)	Log C _{eq} (ug/mL)	Concen in soil at des equil (C _s) (μg/g)	Log C _s (μg/g)
10	0.00000017	-6.770	0.00107	-2.970616222
10	0.0000002	-6.699	0.00106	-2.974694135
25	0.00000053	-6.276	0.00252	-2.598599459
25	0.00000054	-6.268	0.00250	-2.602059991
50	0.00000095	-6.022	0.00524	-2.280668713
50	0.00000111	-5.955	0.00537	-2.270025714
75	0.00000153	-5.815	0.00782	-2.106793247
75	0.00000159	-5.799	0.00782	-2.106793247
100	0.00000205	-5.688	0.01030	-1.987162775
100	0.00000225	-5.648	0.01080	-1.966576245



Data were obtained from Appendix I, pp. 156, 157, 159, 160, 162, 163, 165, 166, 168, and 169 of the study report.

SUMMARY OUTPUT

		SE
KF:	2370.741636	1.504076209
1/n:	0.945421488	0.029033637

Regression Statistics	
Multiple R	0.996248863
R Square	0.992511797
Adjusted R Square	0.991575772
Standard Error	0.034824867
Observations	10

ANOVA

	df	SS	MS	F	Significance F
Regression	1	1.285958554	1.285958554	1060.347096	8.6233E-10
Residual	8	0.009702171	0.001212771		

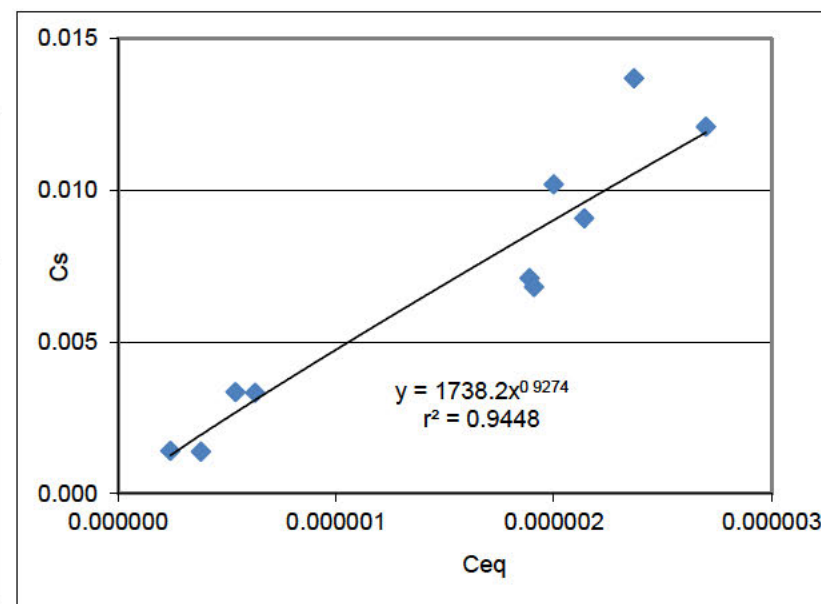
Total 9 1.295660725

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.374884227	0.177269842	19.03811834	5.9991E-08	2.966099239	3.78366922	2.966099239	3.783669215
X Variable 1	0.945421488	0.029033637	32.56297124	8.6233E-10	0.878469801	1.01237318	0.878469801	1.012373175

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.123

Reviewer-calculated Desorption KF values

Marine Sediment				
Initial soln concn (C _o) (ug/mL)	Concen in soln at des equil (C _{eq}) (ug/mL)	Log C _{eq} (ug/mL)	Concen in soil at des equil (C _s) (ug/g)	Log C _s (ug/g)
10	0.00000024	-6.620	0.00141	-2.850780887
10	0.00000038	-6.420	0.00139	-2.8569852
25	0.00000063	-6.201	0.00333	-2.477555766
25	0.00000054	-6.268	0.00335	-2.474955193
50	0.00000189	-5.724	0.00711	-2.148130399
50	0.00000191	-5.719	0.00681	-2.166852888
75	0.00000200	-5.699	0.01020	-1.991399828
75	0.00000214	-5.670	0.00908	-2.041914151
100	0.00000270	-5.569	0.01210	-1.91721463
100	0.00000237	-5.625	0.01370	-1.863279433



Data were obtained from Appendix I, pp. 156, 157, 159, 160, 162, 163, 165, 166, 168, and 169 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.97201594
R Square	0.944814987
Adjusted R Square	0.93791686
Standard Error	0.09140434
Observations	10

		SE
KF:	1738.240186	2.96799654
1/n:	0.927359777	0.079239267

ANOVA

	df	SS	MS	F	Significance F
--	----	----	----	---	----------------

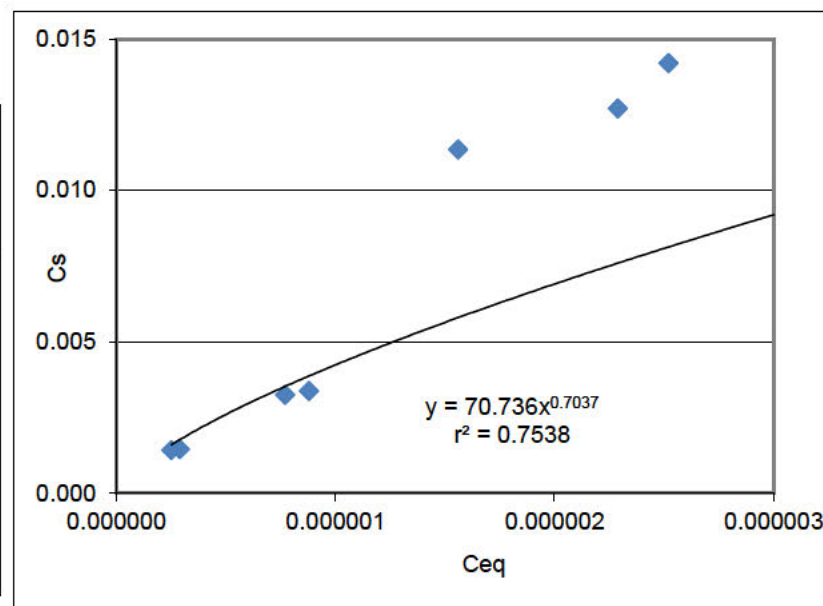
Regression	1	1.14432462	1.14432462	136.9668948	2.59395E-06
Residual	8	0.066838027	0.008354753		
Total	9	1.211162647			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	3.240109786	0.47246339	6.857906565	0.000129943	2.150607254	4.32961232	2.150607254	4.329612318
X Variable 1	0.927359777	0.079239267	11.70328564	2.59395E-06	0.744633699	1.11008585	0.744633699	1.110085854

Chemical: Bifenthrin
PC Code: 128825
MRID: 49175401
Guideline No: 835.123

Reviewer-calculated Desorption KF values

Freshwater Sediment				
Initial soln concn (C _o) (ug/mL)	Concen in soln at des equil (C _{eq}) (μg/mL)	Log C _{eq} (ug/mL)	Concen in soil at des equil (C _s) (μg/g)	Log C _s (μg/g)
10	0.00000029	-6.538	0.00146	-2.835647144
10	0.00000025	-6.602	0.00143	-2.844663963
25	0.00000088	-6.056	0.00338	-2.4710833
25	0.00000077	-6.114	0.00326	-2.4867824
50	0.00000330	-5.481	0.00665	-2.177178355
50	0.00000399	-5.399	0.00670	-2.173925197
75	0.00000156	-5.807	0.01135	-1.945004138
75	0.00000487	-5.312	0.00946	-2.024108864
100	0.00000229	-5.640	0.01270	-1.896196279
100	0.00000252	-5.599	0.01420	-1.847711656



Data were obtained from Appendix I, pp. 156, 157, 159, 160, 162, 163, 165, 166, 168, and 169 of the study report.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.868211627
R Square	0.753791429
Adjusted R Square	0.723015358
Standard Error	0.195321209
Observations	10

		SE
KF:	70.73600531	6.835189692
1/n:	0.703682288	0.142186254

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.934408591	0.934408591	24.49277627	0.001122268
Residual	8	0.305202997	0.038150375		
Total	9	1.239611588			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	1.84964053	0.834750572	2.215800256	0.057557934	-0.07529774	3.7745788	-0.07529774	3.7745788
X Variable 1	0.703682288	0.142186254	4.949017708	0.001122268	0.375800199	1.03156438	0.375800199	1.031564377

Chemical: Bifenthrin
PC Code: 128825
MRID: 49175401
Guideline No: 835.1230

Reviewer-calculated Desorption K_{FOC} values

Soil	Regressed K_F	% Organic carbon	K_{FOC}	Standard Error of K_{FOC}
Iowa Sandy Clay Loam	1581.67	2.6	60833	75.2
Wyoming Clay	4558.80	0.8	562815	226.9
California Sandy Loam	17968.31	0.6	3266966	718.5
North Dakota Loam	2370.74	4.1	57823	36.7
Marine Sediment	1738.24	2.5	69530	118.7
Freshwater Sediment	70.74	3.4	2080	201.0
Mean (%)	4715		670008	
Standard Deviation (%)	6655		1289050	
Coefficient of Variation (%)	141		192	

Percent organic carbon data were obtained from Table II, pp. 35-36 of the study report.

Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.1230

Soil	Regressed K_d	% organic carbon
Iowa Sandy Clay Loam	3966.21	2.6
Wyoming Clay	3823.08	0.8
California Sandy Loam	2457.84	0.6
North Dakota Loam	2383.65	4.1
Marine Sediment	2743.55	2.5
Freshwater Sediment	3250.19	3.4

Percent organic carbon data were obtained from Table II, pp. 35-36 of the study report. The reviewer calculated K_d values using data obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.

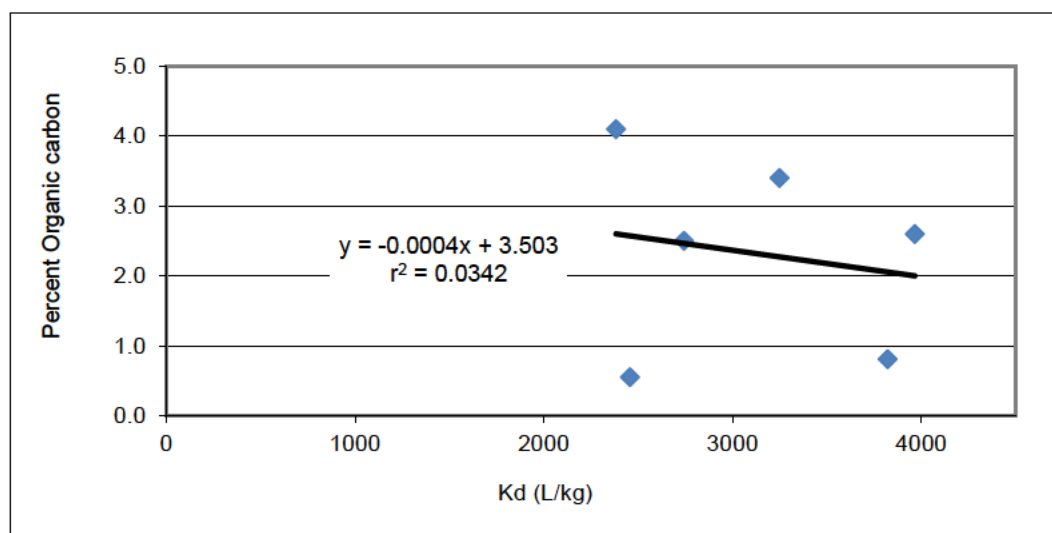
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.184960348
R Square	0.03421033
Adjusted R Square	-0.207237087
Standard Error	1.542812083
Observations	6

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	0.337256839	0.337256839	0.141688532	0.725723256
Residual	4	9.521076495	2.380269124		
Total	5	9.858333333			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	3.503042091	3.188043522	1.098806232	0.333546361	-5.34838574	12.35446992	-5.34838574	12.35446992
X Variable 1	-0.000378976	0.001006803	-0.376415372	0.725723256	-0.003174309	0.002416357	-0.003174309	0.002416357



Chemical: Bifenthrin
 PC Code: 128825
 MRID: 49175401
 Guideline No: 835.1230

Soil	Regressed K _d	% clay
Iowa Sandy Clay Loam	3966.21	22
Wyoming Clay	3823.08	47
California Sandy Loam	2457.84	9
North Dakota Loam	2383.65	27
Marine Sediment	2743.55	5
Freshwater Sediment	3250.19	3

Percent clay data were obtained from Table II, pp. 35-36 of the study report. The reviewer calculated K_d values using data obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.

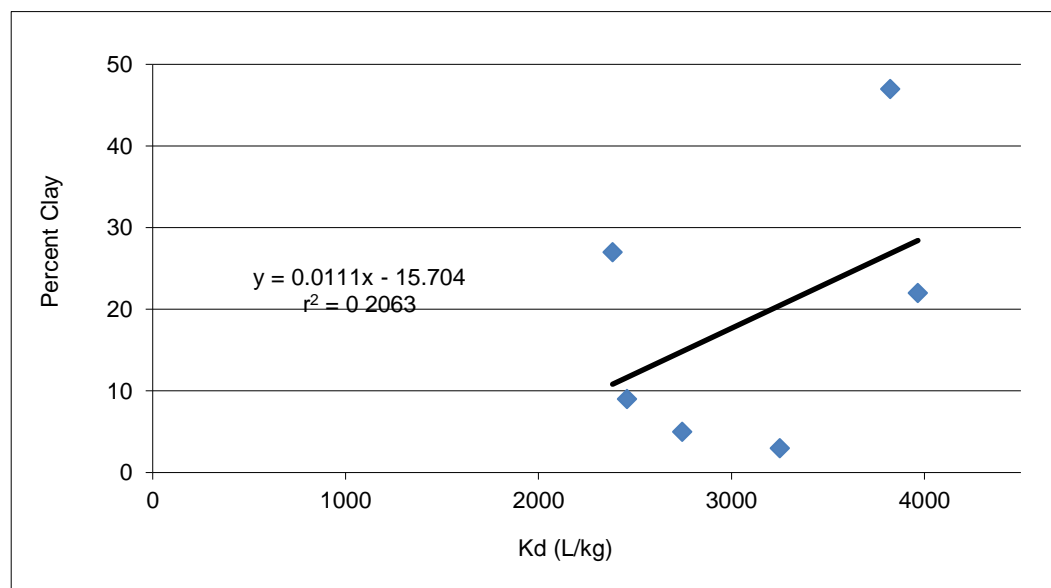
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.454244363
R Square	0.206337941
Adjusted R Square	0.007922426
Standard Error	16.71928201
Observations	6

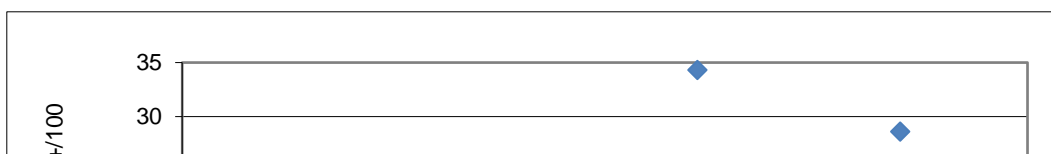
ANOVA

	df	SS	MS	F	Significance F
Regression	1	290.6957692	290.6957692	1.039928461	0.365497379
Residual	4	1118.137564	279.534391		
Total	5	1408.833333			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-15.70369099	34.54847113	-0.454540837	0.67301396	-111.6256246	80.21824258	-111.6256246	80.21824258
X Variable 1	0.011126301	0.010910611	1.019768827	0.365497379	-0.019166411	0.041419012	-0.019166411	0.041419012



Soil	Regressed K _d	CEC
Iowa Sandy Clay Loam	3966.2150	17.4
Wyoming Clay	3823.08	28.6



California Sandy Loam	2457.8445	5.9
North Dakota Loam	2383.6483	23.7
Marine Sediment	2743.5501	34.3
Freshwater Sediment	3250.1945	7.5

CEC data were obtained from Table II, pp. 35-36 of the study report. The reviewer calculated Kd values using data obtained from Appendix I, pp. 155, 158, 161, 164, and 167 of the study report.

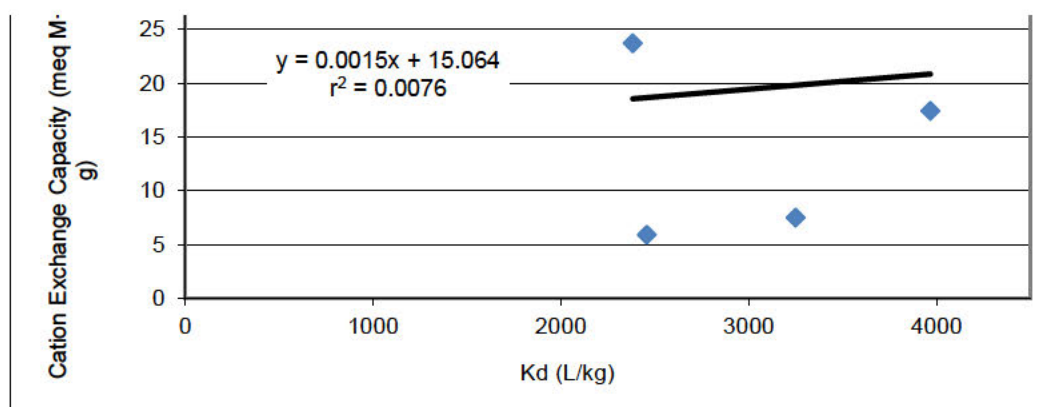
SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.086995892
R Square	0.007568285
Adjusted R Square	-0.240539643
Standard Error	12.72686631
Observations	6

ANOVA

	df	SS	MS	F	Significance F
Regression	1	4.940828904	4.940828904	0.030504004	0.869835366
Residual	4	647.8925044	161.9731261		
Total	5	652.8333333			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	15.06404488	26.29860379	0.572807781	0.597435387	-57.95258489	88.08067465	-57.95258489	88.08067465
X Variable 1	0.001450545	0.008305254	0.174653955	0.869835366	-0.021608536	0.024509627	-0.021608536	0.024509627



Chemical: Bifenthrin
PC Code: 128825
MRID: 49175401
Guideline No: 835.1230